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WESTERN SPRUCE BUDWORM SUPPRESSION AND EVALUATION PROJECT USING CARBARYL

1979

Progress Report No. 3

by

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ABSTRACT

In 1977, carbaryl was aerially applied to a building western spruce budworm, Choristoneura occidentalis Free., outbreak in an isolated mountain range in New Mexico. Sampling results for 1979 show that budworm densities remained low 2 years following treatment. In a comparable untreated check area, larval densities were significantly higher. The average density of egg masses per meter square of foliage, not only confirms the results of the larval sampling, but indicates that the larval densities in the treated area will remain at a low level in 1980. Defoliation of trees in the treated area was lower than in the untreated area.

No lasting adverse effects of the aerial application of carbaryl could be identified for aquatic organisms and birds.

Overall, most species of budworm parasites were not significantly affected by the treatment program. The percent parasitism by some species increased, while other decreased.

Plans are being made to continue the project for several additional years.

I. INTRODUCTION

In 1977, a suppression project was conducted to evaluate the prolonged effects of an insecticide treatment on a building western spruce budworm, Choristoneura occidentalis Free., outbreak to determine if a "population reduction strategy" was a viable alternative. Sevin®-4-oil was aerially applied to 37,450 acres of forested land in an isolated mountain range on the Santa Fe National Forest and the Jemez Pueblo Indian Reservation. The objectives of the project were to: 1) suppress the budworm population to such a low level that mating becomes less likely, parasites and predators become more significant in regulating the population, and density-independent factors, such as weather, keep the budworm population below an economically damaging level; 2) evaluate the effectiveness of suppression for a 2-year period in the treated area and a comparable untreated check area (37,398 acres); and 3) evaluate and compare annual defoliation and tree damages in the treated and untreated areas.

The application phase of the project was successfully completed in 1977 (Parker et al. 1978)[1/]. Criteria established to show treatment success were: (1) reducing the budworm larval density by an average of 90 percent and (2) obtaining an egg mass density of 1.5 new egg masses per meter square of foliage. The 1976-77 budworm generation was reduced by an average of 93.1 percent, compared with a 44.5 percent reduction in the untreated area. The adjusted budworm mortality, using Abbott's formula, was 87.5 percent. One larva per 100 buds of Douglas-fir remained 14 days following treatment. The average density of new egg masses was 1.6 per square meter in the treated area, and 9.9 per square meter in the untreated area. Although an average of 84.1 percent of the budworm larvae were in the fifth and sixth instars and 0.3 percent were pupae at the time of treatment, defoliation was considerably lower than that recorded in the untreated area: treatment area--26.5 percent for Douglas-fir and 37.0 percent for white fir; untreated area--40.8 percent for Douglas-fir and 61.3 percent for white fir.

A comparison of the average pre-spray larval densities, egg mass densities, and defoliation between treated and untreated areas in 1978 shows that suppression effects continued[2/]. Less than one larva per 100 buds of new foliage was recorded in the treatment area.

1/ Parker, Douglas L., Robert E. Acciavatti, and Eugene D. Lessard. 1978. Western spruce budworm suppression and evaluation project using carbaryl. Progress Rep. No. 1, USDA Forest Serv., Southwestern Reg., Albuquerque, NM. R-3 78-11. 136 pp.

2/ Parker, Douglas L., Eugene D. Lessard, and Iral Ragenovich. 1979. Western spruce budworm suppression and evaluation project using carbaryl. Progress Rep. No. 2, USDA Forest Serv., Southwestern Reg., Albuquerque, NM. R-3 79-8. 109 pp.

The average density of larvae in the untreated areas was 8.7 per 100 buds. Egg mass densities were 0.4 and 10.1 per meter square of foliage for the treated area and untreated areas, respectively. Again, defoliation was lower in the treatment area--Douglas-fir, 2.3 percent; white fir, 29.0 percent--than in the untreated area--Douglas-fir, 27.9 percent; white fir, 47.5 percent.

This report presents the results of sampling done in 1979, which was the final year of the project. Raw data for larval and egg mass densities and defoliation are provided in the Appendix.

II. METHODS

A. Entomological Phases

1. Sampling Locations

The treated and untreated areas were divided into six subunits in 1977 (Fig. 1). In each subunit, 25 permanent plots (3-tree cluster) were established, as uniformly as possible, throughout each subunit along roads and trails. Each plot was assigned a unique number. Data were collected on these permanent plots from 1977 to 1979.

2. Timing of Larval Sampling

For between-year-comparison of late-instar larval densities, sampling had to be done at about the same developmental point in the yearly cycle of the budworm. As a result, budworm larval development had to be closely monitored.

During each year of the project, larval development sampling was initiated in late May on all development clusters. In 1977 and 1978, data were obtained from five 2-tree clusters located throughout the range of exposure and elevational differences in each subunit. In 1979, data were collected on 12, 2-tree clusters in the treated and untreated areas. Trees sampled for budworm development were not the same as those used to estimate late-instar larval densities, but clusters were located near sampling points.

Development sampling was started in late May and continued intermittently until buds began to swell. Then, development sampling was done every other day until 90 percent of current bud caps dropped, or 90 percent of the larvae were in the third and fourth instars. At this time, daily sampling was done until at least 20 percent of the larvae were in the fifth and sixth instars.

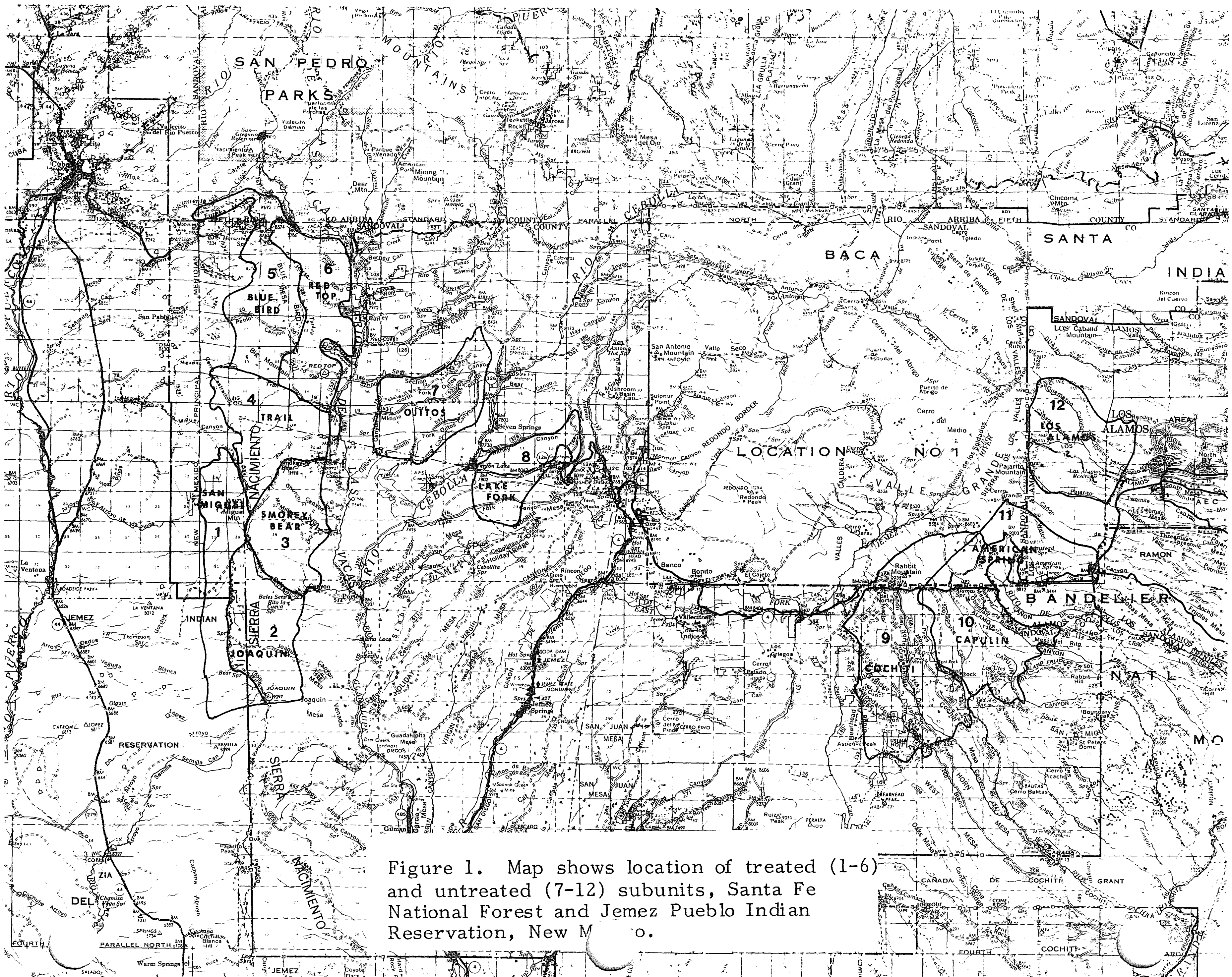

Figure 1. Map shows location of treated (1-6) and untreated (7-12) subunits, Santa Fe National Forest and Jemez Pueblo Indian Reservation, New Mexico.

3. Evaluation of Project Effectiveness

The lasting effectiveness of insecticide treatment was determined by (1) measuring budworm larval and egg mass densities in 1979, and (2) comparing them with similar data collected in 1977 and 1978.

a. Sampling Design for Larvae

Larval sampling began when 20 percent of the larvae were in the fifth and sixth instars (pre-spray sample). Larval density data were obtained on up to 25 plots per subunit. In some subunits, fewer than 25 plots were sampled. Several plots were destroyed by fire and logging, and others were inaccessible due to road closures. Three trees were sampled per plot. Sample trees were codominant Douglas-fir, 30 to 50 feet in height, and relatively open-grown with full crowns. Sample branches were cut from opposite sides of the midcrown of trees with a pole pruner and attached collecting bag. Larval densities were expressed as larvae per 100 live buds to give equal weight to each branch sampled. Cluster means were computed by averaging the larval density on each sample branch per tree, and then averaging the 3-tree means.

b. Sampling Design for Egg Masses

In late July, two branches (70 cm in length) were cut from opposite sides of sample trees on permanent plots. The length and width of each branch was used to calculate foliated branch area.

Foliage from all branches were examined under ultraviolet light for egg masses. Needles bearing egg masses were classed as from current year's foliage, or a previous year, and kept separate in labeled pill boxes. New and old egg masses were separated under a stereomicroscope. All egg masses on current year's foliage were classed as new, and their characteristics formed the basis for aging those egg masses found on the previous year's foliage.

c. Analysis of Population Reduction

Estimates of two types of population density per plot were computed for each sampling period. Larval densities were expressed as the number of late-instar larvae per 100 live buds. Egg mass density was expressed as number of new masses per square meter (1550 sq. in.) of foliage. Subunit and treatment level means and standard errors were computed as follows:

(1) Subscripts:

i = treatments	1 = spray	2 = check
j = subunit	j = 1, 6	
k = cluster	k = 1, 25	
l = tree	l = 1, 3	
m = branch	m = 1, 4 for larval density	
	m = 1, 2 for egg density	

(2) Cluster Level:

Pre-spray population

$$pre_{ijk} = \frac{\sum_{l=1}^{3} \sum_{m=1}^{2} \frac{budworm_{ijklm}}{buds_{ijklm}}}{6} \quad (100)$$

Originally, there were 300 cluster level values for each variable (2 treatments X 6 subunits X 25 clusters = 300), but a lower number was used in 1978 and 1979 because some plots were lost.

(3) Subunit Level Calculations of Means and Standard Errors. Means and standard errors were calculated for each of the three variables at the subunit level. The formulas follow, using X_{ijk} as an example for one of the variables.

$$X_{ij} = \sum_{k=1}^{n} \frac{X_{ijk}}{n}$$

,where X_{ij} is the mean for the $j^{\underline{th}}$ subunit in the $i^{\underline{th}}$ treatment.

$$S.E.\ x_{ij} = \sqrt{\frac{\sum_{k=1}^{n} X_{ijk}^{2} - \frac{\left(\sum_{j=1}^{n} X_{ijk}\right)^{2}}{n}}{(n-1)}},$$

where S.E. x_{ij} is the standard error of the mean x_{ij}.

(4) Treatment Level Calculations of Means and Standard Errors. Assumptions made for each of the subunits are independent of each other and are self-weighting.

$$X_i = \sum_{j=1}^{6} X_{ij/6}$$

where X_i is the mean for the $i^{\underline{th}}$ treatment.

$$S.E.\ x_i = \sum_{j=1}^{6} S.E.\ x_{ij}^2$$

(5) Statistical Tests. Budworm densities were compared for the same year between the treated and untreated check populations, as well as comparing the densities between years for the same populations.

For populations with possibly different means, but common variance, the general linear model was expressed by the following:

$X_{ij} = u + T_i + E_{ij}$, where x_{ij} is the observation of interest in the j^{th} plot of the i^{th} treatment, and T_i is the effect of the treatment mean and with a random error term E_{ij}. The subscript j now represents all of the plots from each subunit in the i^{th} treatment. j = 150 or less.

(a) Assumption: Subsequent yearly samples are independent, taken from the same population.

(b) Hypotheses Tested:

	Treatment		Checks
H1:	year 1 = year 2		year 1 = year 2
H2:	year 2 = year 3		year 2 = year 3
H3:	year 1	=	year 1
H4:	year 2	=	year 2
H5:	year 3	=	year 3

If the treatment effectiveness is long-term, the following results may be expected from testing the various hypotheses:

H3: Expect to be the same
H4, H5: Expect to be different
H1, H2: For the checks, expect to be the same
H1: For treated, expect to be different
H2: For treated, expect to be the same

Since all data can be pooled for the same population and treated as one sample, i.e., 25 clusters for each of six subunits or 150 observations, the test for a difference would be extremely sensitive. However, the intent is not to be able to detect small differences, but rather to be able to state that the residual population in the treated population remains at a low level, i.e., 2-5 budworm per 100 buds. This analysis will be presented in a final report.

B. Tree Damage Appraisal Phases

1. Evaluating Defoliation

a. Immediate

Defoliation on Douglas-fir was sampled on 15 clusters in each subunit each year. In 1977 and 1978, white fir clusters were selected and sampled in eight subunits (subunits 2, 3, 4, and 5 in the treated area, and 8, 9, 10, and 11 in the untreated area, Figure 1. The white fir clusters are adjacent to the Douglas-fir clusters. On all clusters, three codominant Douglas-fir and three codominant white fir trees, 30 to 50 feet tall, with relatively open-grown crowns, were sampled. Defoliation data were collected only on Douglas-fir in 1979.

Sample branches consisted of four apical branches, 70 cm in length, taken from four quadrants at midcrown of each sample tree. From each of these branch samples, 25 new shoots were examined for current defoliation using the left side of one branch and the right side of another, and so on. Each new shoot was individually examined for defoliation and assigned an index value as follows:

6-class

Defoliation class %	Index value	Midpoint value %
0	0	0
1-25	1	12.5
26-50	2	37.5
51-75	3	62.5
76-99	4	87.5
100	5	100

Defoliation estimates were analyzed on a "per cluster" basis.

The following formulas were used to determine the percent defoliation on a "per cluster" basis.

$$\text{Percent defoliation} = \frac{n_1\ (12.5) + n_2\ (37.5) + n_3\ (62.5) + n_4\ (87.5) + n_5\ (100)}{N}$$

where n_1 = number of twiglets with index value 1
n_2 = number of twiglets with index value 2
n_3 = number of twiglets with index value 3
n_4 = number of twiglets with index value 4
n_5 = number of twiglets with index value 5
N = total number of twiglets examined per plot = 300

b. Long-term

The same methods used to evaluate immediate defoliation were used to evaluate long-term defoliation. Regression analysis was used to compare the number of egg masses per square meter of foliage in 1977 to percent defoliation in 1978. This relationship will be examined again for 1978 egg masses and 1979 defoliation. This analysis will be presented in a final report.

2. Tree Mortality and Top-kill

Tree damage data were collected at five locations in each of the treated and untreated subunits, for a total of 60 sample locations. At each location, a cluster of five permanent 1/100-acre fixed radius plots were sampled. Permanent 1/100-acre plots established in 1977 were used as the center plot, and four additional plots were located 100 feet from the center of the permanent plot in cardinal directions. Trees were recorded by species and condition (live, top-killed, dead). Trees with a diameter at breast height (d.b.h.) of less than 0.5 inches or less than 4.5 feet in height were considered as seedlings. Additional categories follow: saplings, 0.5 to 4.9 inches d.b.h; and poles, 5.0 to 9.9 inches d.b.h.; and sawtimber. Pine and spruce trees also were recorded on each plot. Data were analyzed using the PEST computer program [3/].

Neither mortality nor top-killing of sawtimber-size trees occurred from 1977 to 1979 due to the budworm defoliation.

C. Monitoring

1. Aquatic Organisms

Harry Kennedy and Charlie Sanchez, U. S. Fish and Wildlife Services, Albuquerque, New Mexico, sampled San Pablo Creek for aquatic insects. Drift samples, using a 10-inch ring net, were taken for 10 minutes at 7:30 and 8:00 a.m. MDT at one site in 1977, 1978, and 1979. Surber square foot bottom samples were taken at one site in 1977 and 1978, and at five sites in 1979.

Aquatic organisms were identified by Dr. Manuel Molles, Department of Biology, University of New Mexico.

3/ Acciavatti, R. E. and B. W. Geils. 1977. A user's guide to "PEST:" A computer program for summarizing forest insect and disease damage surveys. USDA Forest Serv., Southwestern Reg., Albuquerque, NM. R-3 77-16. 45 pp.

2. Birds

The occurrence of bird species was determined along a 1-mile segment on Smokey Bear Road, subunit 3 (Figure 1), in a forested area where carbaryl had been aerially applied. The surveys were done in the early morning hours. A modification of the transect method described by Emlen[4/] was used. Densities of breeding birds were recorded in 1977 and 1978, but only species were noted in 1979.

3. Parasites of the Western Spruce Budworm

John Schmid, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, completed a third year's sampling to determine the incidence of parasitism of the western spruce budworm. A minimum of 300 budworm larvae were collected in each of the treated and untreated subunits in 1979. Budworm larvae were collected during periods when they were in the 3-5 and 5-6 instars. Larvae were placed in petri dishes with foliage or artificial diet, and the dishes were examined for parasites when most moths had emerged. Each parasite was identified to the species level, and the percent parasitism was determined for each species.

III. RESULTS

A. Entomological Phases

1. Larval Densities

Following treatment, the larval density per 100 buds of new foliage on Douglas-fir remained at a low level from 1977 to 1979. An average of 14.9 larvae was recorded during the 1977 pre-spray sample, about one larvae per 100 buds remained 14 days following treatment, and the pre-spray density decreased to 0.9 in 1978 and 0.6 in 1979 (Table 1).

In the untreated area, the infestation decreased from 12.4 larvae per 100 buds of Douglas-fir to 8.7 larvae in 1978. A slight increase in the larval density was noted in 1979 (Table 1). Overall, the average density of larvae in the untreated area was significantly higher than in the treated area for all 3 years that samples were taken (Fig. 2).

4/ Emlen, J. T. 1971. Population densities of birds derived from transect counts. Auk. 88:323-342.

Table 1. Western spruce budworm larvae and pupae per 100 buds on Douglas-fir for treated (1-6) and untreated check (7-12) subunits, Santa Fe National Forest and Jemez Pueblo Indian Reservation lands, New Mexico.

	Budworm Larvae and Pupae Per 100 Buds of Douglas-fir							
	1977 Pre-spray[a/]		1977 Post-spray		1978 Pre-spray[a/]		1979 Pre-spray[a/]	
Treated Subunits	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
1 San Miguel	20.5	2.5	1.7	0.4	1.3	0.4	0.3	0.1
2 Joaquin	11.9	2.1	0.7	0.2	0.4	0.1	0.5	0.2
3 Smokey Bear	11.7	1.7	1.1	0.3	0.4	0.1	1.0	0.3
4 Trail	17.9	2.2	1.0	0.2	1.2	0.4	0.7	0.2
5 Blue Bird	18.2	2.8	1.1	0.4	1.5	0.7	0.1	0.1
6 Red Top	9.0	1.1	0.6	0.2	0.6	0.2	0.9	0.2
Average	14.9		1.0		0.9		0.6	
Untreated Subunits								
7 Ojitos	2.7	0.4	0.8	0.2	2.0	0.4	1.4	0.3
8 Lake Fork	9.5	1.8	5.8	1.0	10.7	2.0	11.8	1.9
9 Cochiti	8.7	1.5	4.6	0.8	11.8	1.7	11.2	1.3
10 Capulin	17.7	3.0	7.8	1.2	11.5	1.4	10.6	1.5
11 American Springs	12.6	2.1	8.3	1.5	10.8	1.3	9.2	1.1
12 Los Alamos	14.3	2.2	8.1	1.2	5.5	0.8	9.7	1.7
Average	12.4		6.9		8.7		9.0	

a/ Pre-spray samples taken when 20 percent of the larvae was in the fifth and sixth instars, and before 5 percent pupated.

PRE-SPRAY LARVAL DENSITY

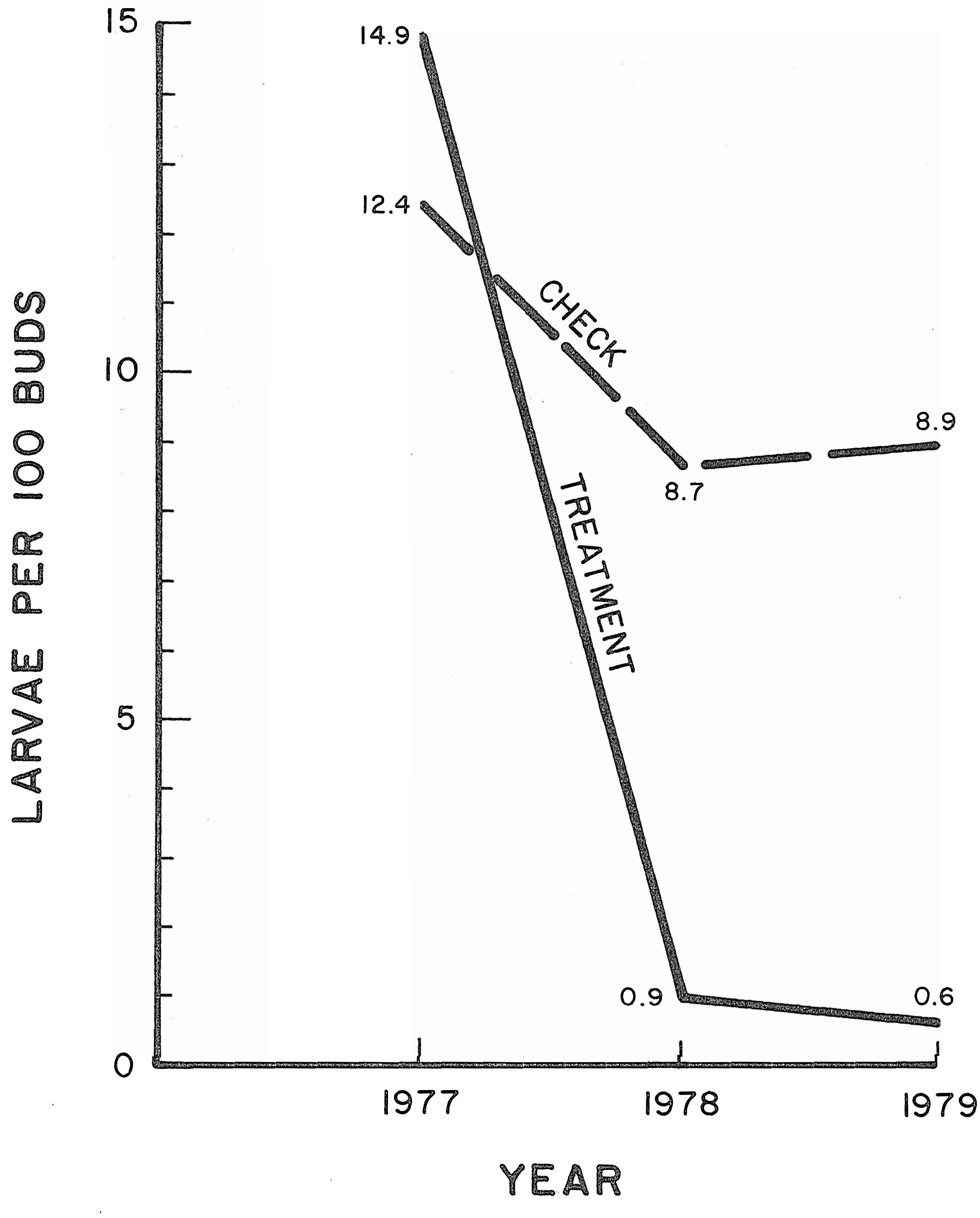

Figure 2.--Comparison of average number of western spruce budworm larvae in treated and untreated check areas, Santa Fe National Forest and Jemez Pueblo Indian Reservation, New Mexico.

2. Egg Mass Densities

The density of egg masses is another population index that indicates that suppression of the budworm population was achieved from 1977 to 1979.

In the treatment area, the average density of egg masses per square meter of foliage decreased from 1.7 in 1977 to 0.4 in 1978, and increased slightly to 0.7 in 1979 (Table 2). The average density of egg masses per meter square of foliage in the untreated areas was: 1977, 9.9; 1978, 10.1; and 1979, 15.9. A marked increase in the average density of egg masses was noted in the untreated area in 1979 (Fig. 3). This increase in the density of eggs indicates that defoliation will be heavier in the untreated area in 1980. Conversely, the infestation will remain at a low level in the treated area in 1980.

B. Tree Damage Appraisal Phase

1. Defoliation

A comparison of defoliation between white fir in 1977 and 1978 and Douglas-fir from 1977 to 1979 in the treated and untreated areas shows that foliage protection was achieved in the treatment area (Table 3, Fig. 4). Even in the treatment year in 1977, when 20 percent of the budworm larvae were in the fifth and sixth instars, the average protection of foliage was about 40 percent for white fir and 35 percent for Douglas-fir. The amount of foliage protected in 1978 was even greater: white fir, 89 percent; Douglas-fir, 90 percent. In 1979, defoliation was measured only on Douglas-fir, and the percent of foliage protected was 91 percent.

2. Other Tree Damages

In 1979, top-killing of understory trees was recorded for the first time. Tree damage data will be presented in a final report that will be published later in 1980.

C. Monitoring

1. Aquatic Organisms

In 1977, populations of aquatic insects were reduced when a portion of the creek was oversprayed. Followup sampling done at one site in June, 1978, 1 year following treatment, revealed that recovery had not occurred (Table 4). Insects in the families Chloroperlidae, Nemouridae, Lepidostomatidae, Limnephilidae, Stratiomyiidae, and Tipulidae were not found. In 1979, Surber bottom sampling was done at several sites, and specimens in all families were collected (Table 5). Although carbaryl is acutely toxic to most aquatic insects,

Table 2. Western spruce budworm egg mass densities on treated (1-6) and untreated check (7-12) subunits, Santa Fe National Forest and Jemez Pueblo Indian Reservation lands, New Mexico.

	Egg Masses Per M^2 of Foliage					
	1977		1978		1979	
Treated Subunits	Mean	S.E.	Mean	S.E.	Mean	S.E.
1 San Miguel	4.2	1.1	0.9	0.3	0.7	0.3
2 Joaquin	1.4	0.5	0.0	0.0	0.2	0.1
3 Smokey Bear	0.2	0.1	0.2	0.1	0.4	0.2
4 Trail	1.9	0.6	0.6	0.2	1.2	0.4
5 Blue Bird	1.2	0.4	0.4	0.2	0.8	0.3
6 Red Top	1.0	0.3	0.5	0.2	0.6	0.3
Average	1.7		0.4		0.6	
Untreated Subunits						
7 Ojitos	1.0	0.3	1.0	0.3	1.5	0.6
8 Lake Fork	7.5	1.7	11.2	2.6	17.9	3.7
9 Cochiti	11.6	2.9	12.4	2.5	21.0	5.2
10 Capulin	14.4	2.5	12.5	1.9	19.2	3.3
11 American Springs	7.4	1.1	11.1	1.7	15.0	2.8
12 Los Alamos	17.5	2.6	12.5	1.9	20.6	3.2
Average	9.9		10.1		15.9	

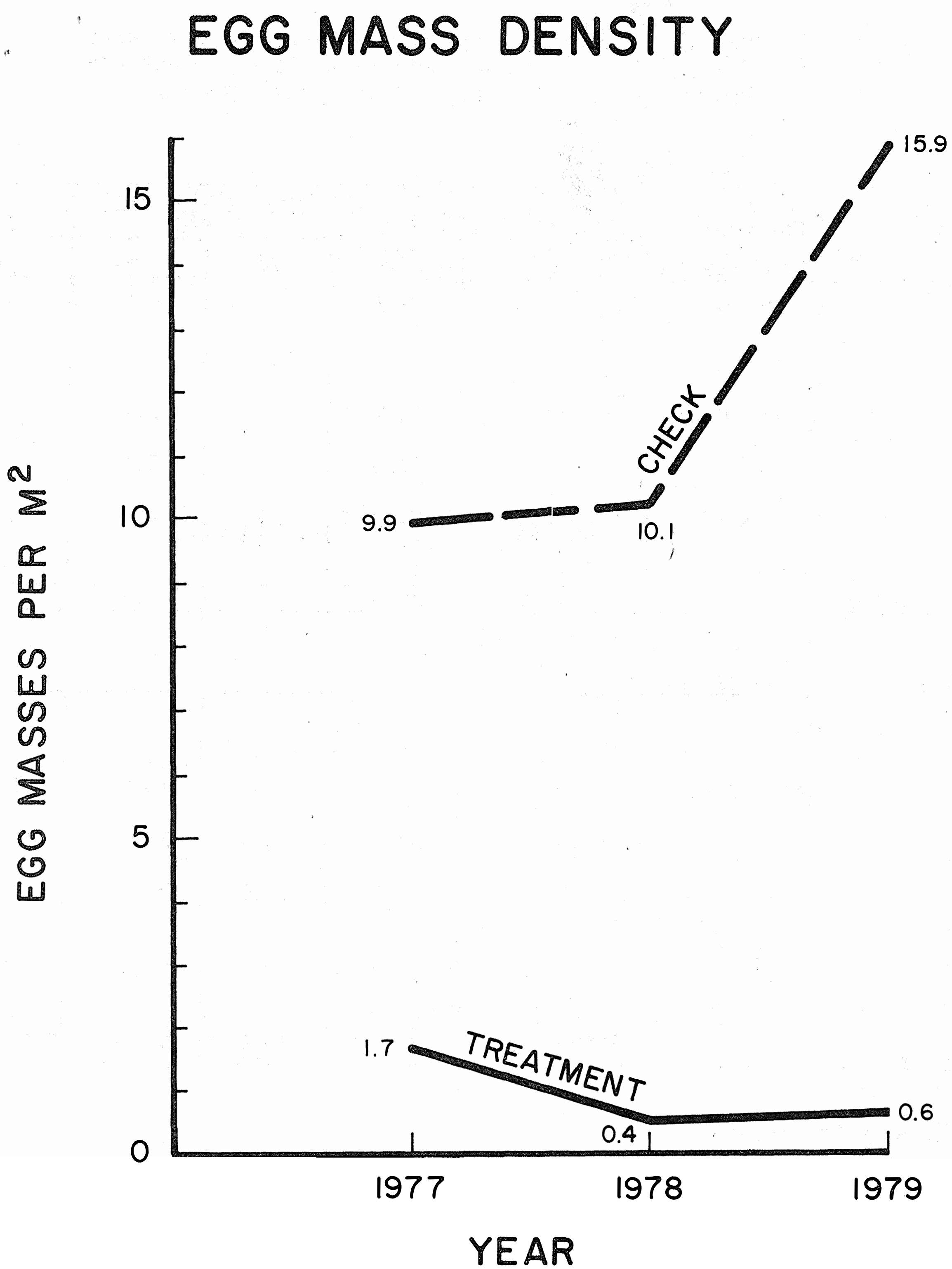

Figure 3.--Comparison of average number of western spruce budworm egg masses in treated and untreated check areas, Santa Fe National Forest and Jemez Pueblo Indian Reservation, New Mexico.

Table 3. Percent defoliation for treated (1-6) and untreated check (7-12) subunits, Santa Fe National Forest and Jemez Pueblo Indian Reservation lands, New Mexico.

Treated Subunits	Percent Defoliation 1977 WF[a/]	1977 DF[b/]	1978 WF	1978 DF	1979 DF
1 San Miguel	--	41.6	--	4.5	3.7
2 Joaquin	28.6	19.9	3.1	1.5	2.0
3 Smokey Bear	24.8	18.0	5.2	1.1	1.0
4 Trail	53.1	37.0	7.2	5.4	2.2
5 Blue Bird	41.8	25.8	5.7	2.7	3.0
6 Red Top	--	16.6	--	2.0	3.2
Average	37.0	26.5	5.3	2.9	2.5
Untreated Subunits					
7 Ojitos	--	14.1	--	9.4	6.8
8 Lake Fork	62.2	51.1	58.1	40.9	34.1
9 Cochiti	52.8	37.2	46.8	35.3	29.4
10 Capulin	63.6	51.2	38.7	29.0	28.3
11 American Springs	66.4	34.2	46.3	29.1	31.6
12 Los Alamos	--	56.7	--	23.8	29.9
Average	61.3	40.8	47.5	27.9	26.7

a/ WF = White fir
b/ DF = Douglas-fir

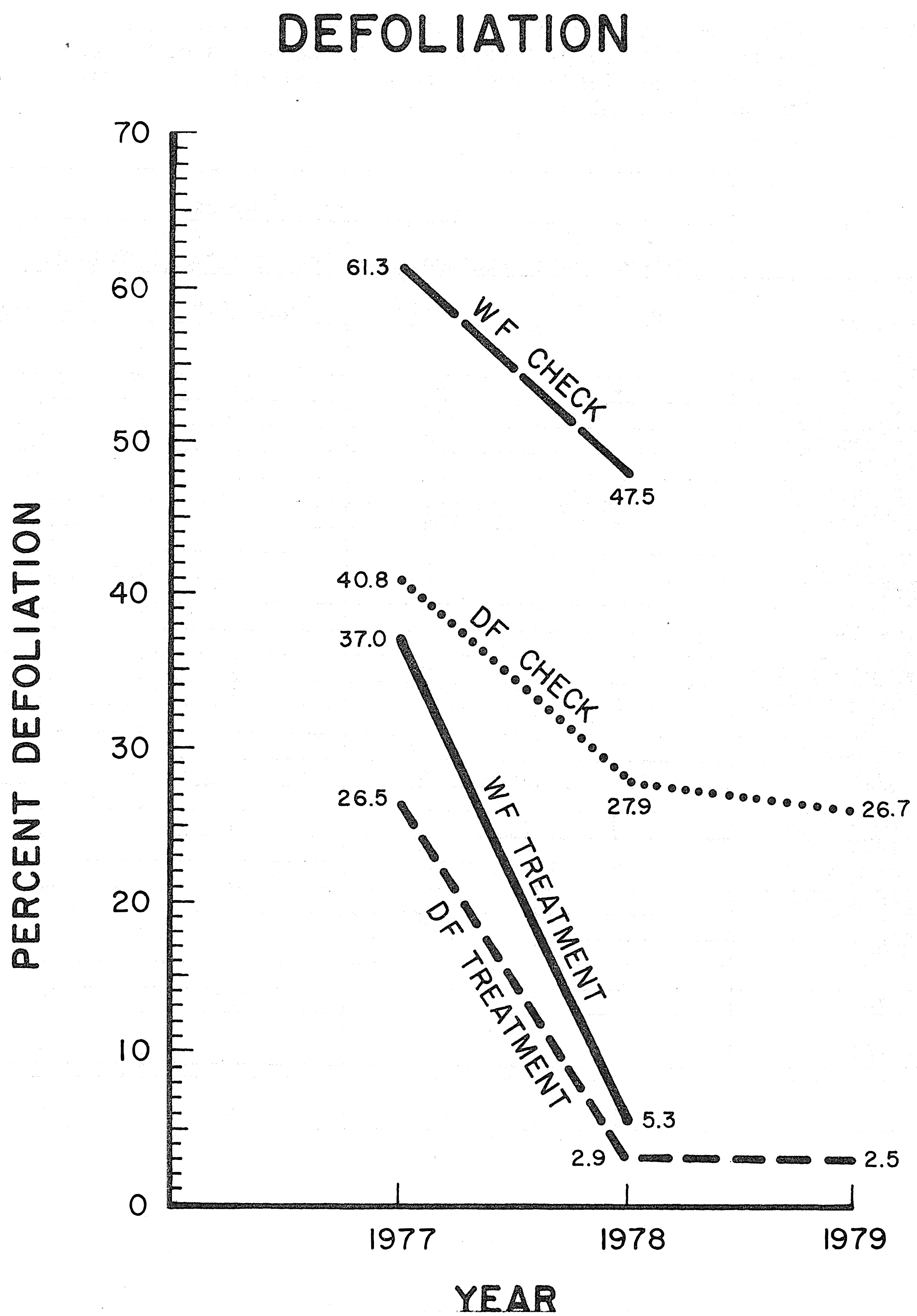

Figure 4.--Comparison of average western spruce budworm-caused defoliation of Douglas-fir (DF) and white fir (WF) in treated and untreated check areas, Santa Fe National Forest and Jemez Pueblo Indian Reservation, New Mexico.

Table 4. Total number of aquatic organisms collected during two 10-minute drift samples taken at 7:30 and 8:00 a.m. MDT at one site in San Pablo Creek, Santa Fe National Forest, New Mexico, 1977 to 1979.

	10-Minute Drift Samples			
	Pre-treatment	Treatment Day	Post-treatment	Post-treatment
Organism	June 1977	June 1977	June 1978	July 1979
EPHEMEROPTERA				
Baetidae	4	355	1	5
Heptageniidae		110		4
Siphlonuridae		4		1
PLECOPTERA				
Chloroperlidae	2	84		1
Nemouridae	1	2748		
Perlidae		1		
Perlodidae		6		
HEMIPTERA				
Veliidae	1			1
TRICHOPTERA				
Lepidostomatidae		98	1	
Lemnephilidae	2	50		
COLEOPTERA				
Hydroscapidae				1
Elmidae		6		
DIPTERA				
Chironomidae	1	13	1	
Dixidae		15		
Simulidae	3	22		7
Stratiomyidae				2
Tipulidae		194		
COLLEMBOLA				
ACARI				
TURBELLARIA	1	4	21	5
UNIDENTIFIED		4	2	1
TOTAL	15	3714	26	28

Table 5. Total nubmer of aquatic organisms collected from Surber square foot bottom samples taken at 1:00 p.m. MDT in San Pablo Creek, Santa Fe National Forest, New Mexico.

	Surber Bottom Samples				
Organism	Pre-treatment[a] June 1977	Treatment Day[a] June 1977	Post-treatment[a] July 1977	Post-treatment[a] June 1978	Post-treatment[b] July 1979
EPHEMEROPTERA					
Baetidae		25		3	73
Heptageniidae		7		3	38
Siphlonuridae					
PLECOPTERA					
Chloroperlidae	2				
Nemouridae	35	7			25
Perlidae		56			3
Perlodidae				1	
HEMIPTERA					
Veliidae				2	4
TRICHOPTERA					
Lepidostomatidae	6				4
Lemnephilidae	2	1			2
COLEOPTERA					
Hydroscapidae				11	
Elmidae	61	48	9	23	28
Dryopidae			1		
Hydrophilidae					5
DIPTERA					
Chironomidae	10	52		31	8
Dixidae	1				4
Simulidae				12	4
Stratiomyidae	10	7			2
Tipulidae	5	1		3	
COLLEMBOLA				1	
HYDRACARINA		1		6	
TURBELLARIA	10	10	19	64	78
NEMATODA		1			2
PELECYPODA				6	3
UNIDENTIFIED				2	2
TOTAL	142	216	29	168	285

a/ Data collected at one site.
b/ Data collected at five sites.

it is apparent that the effects of even a direct application on a small, low-flow creek are temporary and species diversity is not adversely affected.

2. Birds

The diversity of bird species in the treated area was not adversely affected by the aerial application of carbaryl. Prior to treatment in 1977, 40 species of birds were recorded on sample transects. Twenty-five species were observed in 1978; however, the sampling period was shorter, and rainy conditions were encountered when transects were run, which would cause birds to be less active. Almost all of the bird species observed in 1977 were sighted in 1979. The Great-horned owl, Pygmy owl, and Lesser nighthawk were not observed in either 1978 or 1979, mainly because transects were done in the early morning hours. However, these birds were seen in the treatment area following treatment in 1977. Refer to Table 6 for information on the occurrence of bird species in the treatment area in 1977, 1978, and 1979.

3. Insect Parasites of the Western Spruce Budworm

The percent parasitism by insect parasites in the treatment year and two subsequent years showed that some species increased while others decreased. Overall, most species were not significantly affected as a result of the aerial application of carbaryl. *Glypta fumiferanae* (Ichneumonidae) decreased significantly in the sprayed areas, while another ichneumonid parasite, *Phytodietus fumiferanae*, increased in the same areas. *Apanteles fumiferanae* (Braconidae) increased significantly in two of the treated areas the first year after spraying, but densities were about the same in treated and untreated areas in 1979. Other parasites decreased the first year following treatment, but their numbers were comparable to untreated areas the second year following treatment. Numbers of several parasites were too low to determine any trend in percent parasitism.

The results of the insect parasite work will be published in the near future[5/].

IV. FUTURE PLANS

Plans are being made to evaluate suppression effects until the current outbreak subsides, or until densities of insects reach comparable levels in the treated and untreated areas. Larval and egg mass densities, defoliation, and tree damage sampling will be done in treated and untreated subunits, although only about half of the 25 permanent cluster plots will be sampled each year. Annual progress reports will be issued.

5/ Personal communication. J. M. Schmid. Rocky Mountain Forest and Range Exp. Sta., 240 W. Prospect St., Fort Collins, Colo. 80526.

Table 6. Species of birds seen in the area treated with carbaryl in 1977, Santa Fe National Forest, New Mexico.

		Results [a]		
Common Name	Species	1977	1978	1979
Turkey Vulture	*Cathartes aura*	P	---	P
Cooper's Hawk	*Accipiter cooperii*	P	---	P
Turkey	*Meleagris gallopavo*	P	---	P
Mourning Dove	*Zenaidura macroura*	P	---	P
Great Horned Owl	*Bubo virginianus*	P	---	P
Pygmy Owl	*Glaucidium gnoma*	P	---	---
Lesser Nighthawk	*Chordeiles acutipennis*	P	---	---
Rufous Hummingbird	*Selasphorus rufus*	P	---	P
Broad-tailed Hummingbird	*Selasphorus platycercus*	P	---	P
Red-shafted Flicker	*Colaptes auratus*	P	P	P
Williamson's Sapsucker	*Sphyrapicus thyroideus*	P	P	P
Hairy Woodpecker	*Dendrocopos villosus*	P	P	P
Northern Three-toed Woodpecker	*Picoides tridactylus*	P	---	P
Empidonax species	*Empidonax* sp.	P	P	P
Western Wood Pewee	*Contopus sordidulus*	P	P	---
Violet-green Swallow	*Tachycineta thalassina*	P	---	P
Steller's Jay	*Cyanocitta stelleri*	P	P	P
Common Raven	*Corvus corax*	P	P	P
Clark's Nutcracker	*Nucifraga columbiana*	P	P	P

Table 6.--continued.

		Results a/		
Common Name	Species	1977	1978	1979
Mountain Chickadee	*Parus gambeli*	P	P	P
White-breasted Nuthatch	*Sitta carolinensis*	P	P	P
Red-breasted Nuthatch	*Sitta canadensis*	P	P	---
Pygmy Nuthatch	*Sitta pygmaea*	P	---	P
House Wren	*Troglodytes aedon*	P	P	P
American Robin	*Turdus migratorius*	P	P	P
Hermit Thrush	*Hylocichla guttata*	P	P	P
Western Bluebird	*Sialia mexicana*	P	P	P
Townsend's Solitaire	*Myadestes townsendi*	P	P	P
Golden-crowned Kinglet	*Regulus satrapa*	P	P	P
Ruby-crowned Kinglet	*Regulus calendula*	P	P	P
Warbling Vireo	*Vireo gilvus*	P	P	P
Orange-crowned Warbler	*Vermivora celata*	P	---	P
Audubon's Warbler	*Dendroica coronata*	P	P	P
Western Tanager	*Piranga ludoviciana*	P	P	P
Black-headed Grosbeak	*Pheucticus melanocephalus*	P	---	P
Evening Grosbeak	*Hesperiphona vespertina*	P	P	---
Pine Siskin	*Spinus pinus*	P	---	P
Gray-headed Junco	*Junco hyemalis*	P	P	P
Chipping Sparrow	*Spizella passerina*	P	P	P

a/ Present (P), not observed (---).

V. APPENDIX

An explanation of the information presented on data summary sheets follows:

A. Cluster numbering system: cluster 1 = trees 1, 2, and 3; cluster 4 = trees 4, 5, and 6; etc.

B. Larval densities per 100 buds is on Douglas-fir.

C. Host code on egg mass sheets: 1 = Douglas-fir

D. Refer to Progress Report No. 1 (footnote 1) for an explanation of the 4-class defoliation system.

E. Refer to Progress Report No. 2 (footnote 2) for summaries of 1977 and 1978 data.

A. Larval Density Data - 1979

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME SAN MIGUEL SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
1	1	.00	.00	.00	.00
1	4	.00	.40	.00	.40
1	7	.36	.56	.00	.92
1	10	.00	.00	.00	.00
1	13	.00	.00	.00	.00
1	16	.00	.00	.00	.00
1	19	.00	.00	.00	.00
1	22	.00	.00	.00	.00
1	25	.36	.00	.00	.36
1	28	.27	.00	.00	.27
1	31	.00	.00	.00	.00
1	34	.00	.00	.00	.00
1	37	.93	.00	.00	.93
1	40	.43	.00	.00	.43
1	43	2.53	.00	.00	2.53
1	46	.23	.00	.00	.23
1	49	.00	.00	.00	.00
1	61	.00	.00	.00	.00
1	64	.00	.00	.00	.00
1	67	.00	.00	.00	.00
1	70	.00	.00	.00	.00

	LARVAE	PUPAE	CASES	TOTAL
NUMBER OF CLUSTERS	21.			
BLOCK MEANS	.244	.045	.000	.289
STANDARD ERRORS	.126	.032	.000	.129
VARIANCE	.3	.0	.0	.3

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME JOAQUIN SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
2	73	1.28	.00	.00	1.28
2	76	.23	.00	.00	.23
2	79	.25	.00	.00	.25
2	82	.14	.00	.00	.14
2	85	.39	.00	.00	.39
2	88	3.23	.00	.00	3.23
2	91	.29	.00	.00	.29
2	94	.92	.00	.00	.92
2	97	.00	.00	.00	.00
2	106	1.45	.00	.00	1.45
2	109	.10	.00	.00	.10
2	112	.33	.00	.00	.33
2	115	.00	.00	.00	.00
2	118	.24	.00	.00	.24
2	121	.00	.00	.00	.00
2	124	.00	.00	.00	.00
2	127	.60	.00	.00	.60
2	133	.59	.00	.00	.59
2	136	1.21	.00	.00	1.21
2	139	.00	.00	.00	.00
2	142	.74	.00	.00	.74
2	145	.35	.00	.00	.35
2	148	.11	.00	.00	.11

	LARVAE	PUPAE	CASES	TOTAL
NUMBER OF CLUSTERS	23.			
BLOCK MEANS	.540	.000	.000	.540
STANDARD ERRORS	.152	.000	.000	.152
VARIANCE	.5	.0	.0	.5

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME SMOKEY BEAR SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
3	151	.25	.00	.00	.25
3	154	1.69	.00	.00	1.69
3	157	.67	.00	.00	.67
3	160	.75	.00	.00	.75
3	163	.00	.00	.00	.00
3	166	.00	.00	.00	.00
3	169	1.19	.00	.00	1.19
3	172	.31	.00	.00	.31
3	175	.00	.00	.00	.00
3	178	.56	.00	.00	.56
3	181	.91	.00	.00	.91
3	184	.19	.00	.00	.19
3	187	.97	.00	.00	.97
3	190	.00	.00	.00	.00
3	193	6.22	.00	.00	6.22
3	196	3.56	.15	.00	3.71
3	199	1.34	.00	.00	1.34
3	202	1.23	.00	.00	1.23
3	205	.14	.00	.00	.14
3	208	.00	.00	.00	.00
3	211	.76	.00	.00	.76
3	214	1.50	.00	.00	1.50
3	217	.00	.00	.00	.00
3	220	1.49	.00	.00	1.49
3	223	.00	.00	.00	.00
NUMBER OF CLUSTERS		25.			
BLOCK MEANS		.949	.006	.000	.955
STANDARD ERRORS		.273	.006	.000	.276
VARIANCE		1.9	.0	.0	1.9

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME TRAIL SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
4	226	.25	.23	.00	.47
4	229	.00	.00	.00	.00
4	232	.00	.00	.00	.00
4	235	1.59	.54	.00	2.13
4	238	.17	.00	.00	.17
4	241	1.64	.00	.00	1.64
4	244	.00	.24	.00	.24
4	247	.53	.00	.00	.53
4	250	2.02	.00	.00	2.02
4	253	.00	.00	.00	.00
4	256	.83	.00	.00	.83
4	259	.69	.35	.00	1.04
4	262	.20	.00	.00	.20
4	265	.00	.00	.00	.00
4	277	1.40	.52	.00	1.91
4	280	.19	.00	.00	.19
4	283	.00	.00	.00	.00
4	286	.00	.00	.00	.00
4	289	.00	.00	.00	.00
4	292	.00	.00	.00	.00
4	298	.99	2.05	.00	3.04
NUMBER OF CLUSTERS		21.			
BLOCK MEANS		.500	.186	.000	.686
STANDARD ERRORS		.143	.101	.000	.200
VARIANCE		.4	.2	.0	.8

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME BLUE BIRD SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
5	301	.00	.00	.00	.00
5	304	.00	.00	.00	.00
5	307	.00	.00	.00	.00
5	310	.00	.00	.00	.00
5	313	.00	.00	.00	.00
5	316	.32	.00	.00	.32
5	319	.33	.00	.00	.33
5	322	.00	.00	.00	.00
5	325	.00	.00	.00	.00
5	328	.17	.00	.00	.17
5	331	.00	.00	.00	.00
5	334	.00	.00	.00	.00
5	337	.00	.00	.00	.00
5	340	.22	.00	.00	.22
5	343	.00	.00	.00	.00
5	346	.00	.06	.00	.06
5	349	.35	.00	.00	.35
5	352	.00	.00	.00	.00
5	355	.00	.39	.00	.39
5	358	.00	.00	.00	.00
5	361	1.43	.12	.00	1.55
5	364	.00	.00	.00	.00
5	367	.00	.00	.00	.00
5	373	.00	.00	.00	.00

	LARVAE	PUPAE	CASES	TOTAL
NUMBER OF CLUSTERS	24.			
BLOCK MEANS	.118	.024	.000	.141
STANDARD ERRORS	.062	.017	.000	.067
VARIANCE	.1	.0	.0	.1

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME RED TOP SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
6	376	.00	.00	.00	.00
6	382	1.86	.00	.00	1.86
6	385	.47	.00	.00	.47
6	388	1.27	.00	.00	1.27
6	391	2.93	.00	.00	2.93
6	394	2.74	.00	.00	2.74
6	397	.54	.00	.00	.54
6	400	.93	.00	.00	.93
6	403	.00	.00	.00	.00
6	406	.67	.00	.00	.67
6	409	.16	.00	.00	.16
6	412	1.63	.00	.00	1.63
6	415	.91	.00	.00	.91
6	418	.95	.00	.00	.95
6	421	.00	.00	.00	.00
6	424	.00	.00	.00	.00
6	427	.25	.00	.00	.25
6	430	.26	.00	.00	.26
6	433	.80	.00	.00	.80
6	436	2.20	.00	.00	2.20
6	439	.69	.00	.00	.69
6	442	.65	.00	.00	.65
6	445	1.01	.00	.00	1.01
6	448	.79	.00	.00	.79

	LARVAE	PUPAE	CASES	TOTAL
NUMBER OF CLUSTERS	24.			
BLOCK MEANS	.905	.000	.000	.905
STANDARD ERRORS	.170	.000	.000	.170
VARIANCE	.7	.0	.0	.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME OJITOS SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
7	451	.29	.00	.00	.29
7	454	2.04	.00	.00	2.04
7	457	1.32	.00	.00	1.32
7	460	3.90	.00	.00	3.90
7	463	2.71	.00	.00	2.71
7	466	.62	.00	.00	.62
7	469	2.48	.00	.00	2.48
7	472	1.11	.00	.00	1.11
7	475	.00	.00	.00	.00
7	478	3.22	.00	.00	3.22
7	481	.91	.35	.00	1.60
7	484	.66	.00	.00	.66
7	487	.51	.00	.00	.51
7	490	.00	.00	.00	.00
7	493	.37	.00	.00	.37
7	496	2.91	.00	.00	2.91
7	499	2.90	.00	.00	2.90
7	502	.35	.00	.00	.35
7	505	.46	.00	.00	.46
7	508	.60	.00	.00	.60
7	511	.32	.00	.00	.32
7	514	1.05	.00	.00	1.05
7	517	.00	.00	.00	.00
7	520	.58	.00	.00	.58
7	523	3.88	.00	.00	3.88

	LARVAE	PUPAE	CASES	TOTAL
NUMBER OF CLUSTERS	25.			
BLOCK MEANS	1.327	.014	.000	1.355
STANDARD ERRORS	.253	.014	.000	.253
VARIANCE	1.6	.0	.0	1.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME LAKE FORK SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
8	526	.96	.00	.00	.96
8	529	2.51	.00	.00	2.51
8	532	6.43	.00	.00	6.43
8	535	2.40	.00	.00	2.40
8	538	4.25	.00	.00	4.25
8	541	2.23	.00	.00	2.23
8	544	26.13	.00	.00	26.13
8	547	9.93	.00	.00	9.93
8	550	5.48	.00	.00	5.48
8	553	13.51	.00	.00	13.51
8	556	28.72	.00	.00	28.72
8	559	24.71	.00	.00	24.71
8	562	20.40	.00	.00	20.40
8	565	14.08	.00	.00	14.08
8	568	14.26	.00	.00	14.26
8	571	15.08	.00	.00	15.08
8	574	.00	.00	.00	.00
8	577	18.70	.00	.00	18.70
8	580	9.19	.00	.00	9.19
8	583	1.64	.00	.00	1.64
8	586	6.96	.00	.00	6.96
8	589	7.63	.00	.00	7.63
8	592	5.69	.00	.00	5.69
8	595	34.57	.00	.00	34.57
8	598	14.72	.00	.00	18.29

	LARVAE	PUPAE	CASES	TOTAL
NUMBER OF CLUSTERS	25.			
BLOCK MEANS	11.608	.000	.000	11.751
STANDARD ERRORS	1.902	.000	.000	1.917
VARIANCE	90.5	.0	.0	91.9

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME COCHITI SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
9	601	.75	.00	.00	.75
9	604	8.99	.00	.00	8.99
9	607	11.42	.00	.00	11.42
9	610	20.89	.00	.00	20.89
9	613	4.12	.00	.00	4.12
9	616	2.06	.00	.00	2.06
9	625	9.71	.00	.00	9.71
9	628	10.72	.00	.00	10.72
9	631	15.46	.00	.00	15.46
9	634	14.54	.00	.00	14.54
9	637	9.44	.00	.00	9.44
9	640	15.94	.18	.00	16.12
9	643	17.65	.00	.00	17.65
9	646	9.35	.00	.00	9.35
9	649	9.28	.00	.00	9.28
9	652	16.85	.00	.00	16.85
9	655	16.90	.00	.00	16.90
9	658	20.45	.00	.00	20.45
9	661	9.92	.00	.00	9.92
9	664	10.08	.00	.00	10.08
9	670	.53	.00	.00	.53
NUMBER OF CLUSTERS		21.			
BLOCK MEANS		11.193	.009	.000	11.202
STANDARD ERRORS		1.304	.009	.000	1.306
VARIANCE		35.7	.0	.0	35.8

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME CAPULIN SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
10	676	12.14	.00	.00	12.14
10	679	2.96	.00	.00	2.96
10	682	5.34	.00	.00	5.34
10	694	8.56	.00	.00	8.56
10	697	8.50	.00	.00	8.50
10	700	20.15	.00	.00	20.15
10	703	10.74	.00	.00	10.74
10	706	8.39	.00	.00	8.39
10	709	10.39	.00	.00	10.39
10	712	8.10	.00	.00	8.10
10	715	10.34	.00	.00	10.34
10	718	11.98	.00	.00	11.98
10	721	11.98	.00	.00	11.98
10	724	24.21	.00	.00	24.21
10	727	8.09	.00	.00	8.09
10	730	26.65	.00	.00	26.65
10	733	2.79	.00	.00	2.79
10	736	1.04	.00	.00	1.04
10	739	3.29	.00	.00	3.29
10	742	3.38	.00	.00	3.38
10	745	15.68	.00	.00	15.68
10	748	18.02	.00	.00	18.02
NUMBER OF CLUSTERS		22.			
BLOCK MEANS		10.577	.000	.000	10.577
STANDARD ERRORS		1.465	.000	.000	1.465
VARIANCE		47.2	.0	.0	47.2

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME AMERICAN SPRINGS SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
11	751	20.11	.00	.00	20.11
11	754	19.42	.00	.00	19.42
11	757	10.94	.00	.00	10.94
11	760	6.19	.00	.00	6.19
11	763	12.83	.00	.00	12.83
11	766	6.92	.00	.00	6.92
11	769	16.49	.00	.00	16.49
11	772	12.36	.00	.00	12.36
11	775	4.39	.00	.00	4.39
11	778	1.34	.00	.00	1.34
11	781	3.55	.00	.00	3.55
11	784	2.31	.00	.00	2.31
11	787	10.57	.00	.00	10.57
11	790	12.96	.00	.00	12.96
11	793	17.87	.00	.00	17.87
11	796	5.73	.00	.00	5.73
11	799	9.78	.00	.00	9.78
11	802	3.48	.00	.00	4.52
11	805	7.41	.00	.00	7.41
11	808	5.81	.00	.00	5.81
11	811	4.52	.00	.00	4.52
11	814	8.18	.00	.00	8.18
11	817	14.94	.00	.00	14.94
11	820	5.07	.00	.00	5.07
11	823	6.80	.00	.00	6.80

NUMBER OF CLUSTERS	25.			
BLOCK MEANS	9.199	.000	.000	9.241
STANDARD ERRORS	1.089	.000	.000	1.080
VARIANCE	29.6	.0	.0	29.2

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

REGION 3

CLUSTER LEVEL MEANS -- BUDWORM PER 100 BUDS

UNIT NAME LOS ALAMOS SURVEY PERIOD PRE-SPRAY 1979

UNIT	CLUSTER	LARVAE	PUPAE	CASES	TOTAL
12	826	15.35	.19	.00	15.54
12	829	1.89	.00	.00	1.89
12	832	2.05	.00	.00	2.05
12	835	1.53	.00	.00	1.53
12	838	6.99	.00	.00	6.99
12	841	9.71	.00	.00	9.71
12	844	14.33	.00	.00	14.33
12	847	9.59	.00	.00	9.77
12	850	10.58	.00	.00	10.58
12	853	13.43	.00	.00	13.43
12	856	7.96	.00	.00	7.96
12	859	8.47	.00	.00	8.47
12	862	11.16	.00	.00	11.16
12	865	8.75	.00	.00	8.75
12	868	13.54	.00	.00	13.54
12	871	43.04	.00	.00	43.04
12	874	14.01	.00	.00	14.01
12	877	11.11	.29	.00	11.40
12	880	.00	.00	.00	.00
12	883	2.20	.00	.00	2.20
12	886	1.23	.00	.00	1.23
12	889	3.85	.00	.00	3.85
12	892	10.13	.00	.00	10.13
12	895	6.77	.00	.00	6.77
12	898	13.45	.00	.00	13.45

NUMBER OF CLUSTERS	25.			
BLOCK MEANS	9.645	.019	.000	9.672
STANDARD ERRORS	1.681	.014	.000	1.682
VARIANCE	70.6	.0	.0	70.8

NORMAL END OF JOB!!!!!!

EOF
EOF IGNORED - IN CONTROL MODE

BRKPT PRINT*

B. Egg Mass Density Data - 1979

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 1 SAN MIGUEL 7

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	OLD	NUMBER ROWS	LENGTH
1	.148	.000	.0	.0	.0	.0	.0	.0	.0	.0
4	.125	.000	.0	.0	.0	.0	.0	.0	.0	.0
7	.148	.000	1.2	.0	.2	.0	.0	.0	.0	.0
10	.136	.000	1.1	.0	.2	.0	.0	.0	.0	.0
13	.113	.000	.0	.0	.0	.0	.0	.0	.0	.0
16	.152	.000	.0	.0	.0	.0	.0	.0	.0	.0
19	.140	.000	.0	.0	.0	.0	.0	.0	.0	.0
25	.084	.000	.0	.0	.0	.0	.0	.0	.0	.0
28	.176	.000	.0	.0	.0	.0	.0	.0	.0	.0
31	.147	.000	1.3	.0	.2	.0	.0	.0	.0	.0
34	.108	.000	.0	.0	.0	.0	.0	.0	.0	.0
37	.177	.000	.9	.0	.2	.0	.0	.0	.0	.0
40	.162	.000	.0	.0	.0	.0	.0	.0	.0	.0
43	.148	.000	1.0	.0	.2	.0	.0	.0	.0	.0
46	.167	.000	.0	.0	.0	.0	.0	.7	.0	.0
49	.143	.000	1.4	.0	.2	.0	.0	.0	.0	.0
55	.174	.000	.0	.0	.0	.0	.0	.0	.0	.0
58	.140	.000	4.4	.0	.7	.0	.0	.0	.0	.0
61	.156	.000	.0	.0	.0	.0	.0	.0	.0	.0
64	.149	.000	.0	.0	.0	.0	.0	.0	.0	.0
67	.138	.000	1.0	.0	.2	.0	.0	.0	.0	.0
70	.188	.000	4.7	.0	.8	.0	.0	.0	.0	.0
73	.130	.000	.0	.0	.0	.0	.0	.0	.0	.0
CLUSTERS	23.								0.	
MEAN	.146	.000	.7	.0	.1	.0	.0	.0	.0	.0
S.E.	.005	.000	.3	.0	.0	.0	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 2 JOAQUIN

CLUSTER	BRANCH AREA (L*W)/2	GRID	EGG MASS / M**2 (L*W)/2	GRID	NUMBER	EGG MASS PER BRANCH GOOD	BAD	OLD	NUMBER ROWS	LENGTH
76	.108	.000	2.2	.0	.2	.0	.0	.0	.0	.0
79	.118	.000	.0	.0	.0	.0	.0	.0	.0	.0
82	.132	.000	.8	.0	.2	.0	.0	.0	.0	.0
85	.155	.000	.8	.0	.2	.0	.0	.0	.0	.0
88	.136	.000	.0	.0	.0	.0	.0	.0	.0	.0
91	.070	.000	.0	.0	.0	.0	.0	.0	.0	.0
94	.146	.000	.0	.0	.0	.0	.0	.0	.0	.0
97	.101	.000	1.6	.0	.2	.0	.0	.0	.0	.0
106	.121	.000	.0	.0	.0	.0	.0	.0	.0	.0
109	.109	.000	.0	.0	.0	.0	.0	.0	.0	.0
112	.102	.000	.0	.0	.0	.0	.0	.0	.0	.0
115	.109	.000	.0	.0	.0	.0	.0	.0	.0	.0
118	.110	.000	.0	.0	.0	.0	.0	.0	.0	.0
121	.157	.000	.0	.0	.0	.0	.0	.2	.0	.0
124	.124	.000	.0	.0	.0	.0	.0	.2	.0	.0
127	.128	.000	.0	.0	.0	.0	.0	.0	.0	.0
133	.162	.000	.0	.0	.0	.0	.0	.0	.0	.0
136	.115	.000	.0	.0	.0	.0	.0	.0	.0	.0
139	.104	.000	.0	.0	.0	.0	.0	.0	.0	.0
142	.168	.000	.0	.0	.0	.0	.0	.0	.0	.0
145	.169	.000	.0	.0	.0	.0	.0	.0	.0	.0
148	.146	.000	.0	.0	.0	.0	.0	.0	.0	.0
CLUSTERS	22.								0.	
MEAN	.130	.000	.2	.0	.0	.0	.0	.0	.0	.0
S.E.	.006	.000	.1	.0	.0	.0	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 3 SMOKEY BEAR

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	EGG MASS PER BRANCH NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	EGG MASS PER BRANCH OLD	NUMBER ROWS	LENGTH
151	.110	.000	.0	.0	.0	.0	.0	.0	.0	.0
154	.095	.000	.0	.0	.0	.0	.0	.0	.0	.0
157	.074	.000	.0	.0	.0	.0	.0	.0	.0	.0
160	.153	.000	1.1	.0	.2	.0	.0	.0	.0	.0
163	.178	.000	3.0	.0	.5	.0	.0	.0	.0	.0
166	.178	.000	.0	.0	.0	.0	.0	.0	.0	.0
169	.087	.000	.0	.0	.0	.0	.0	.0	.0	.0
172	.097	.000	.0	.0	.0	.0	.0	.0	.0	.0
175	.157	.006	.0	.0	.0	.0	.0	.0	.0	.0
178	.091	.000	.0	.0	.0	.0	.0	.0	.0	.0
181	.150	.000	.0	.0	.0	.0	.0	.0	.0	.0
184	.154	.000	.0	.0	.0	.0	.0	.0	.0	.0
187	.098	.000	.0	.0	.0	.0	.0	.0	.0	.0
190	.190	.000	.0	.0	.0	.0	.0	.0	.0	.0
193	.161	.000	1.8	.0	.3	.0	.0	.3	.0	.0
196	.152	.000	.0	.0	.0	.0	.0	.0	.0	.0
199	.118	.000	.0	.0	.0	.0	.0	.0	.0	.0
202	.152	.000	.0	.0	.0	.0	.0	.0	.0	.0
205	.094	.000	.0	.0	.0	.0	.0	.0	.0	.0
208	.094	.000	1.2	.0	.2	.0	.0	.0	.0	.0
211	.135	.000	.0	.0	.0	.0	.0	.0	.0	.0
214	.163	.000	2.5	.0	.3	.0	.0	.0	.0	.0
217	.087	.000	.0	.0	.0	.0	.0	.0	.0	.0
220	.148	.000	.0	.0	.0	.0	.0	.0	.0	.0
223	.114	.000	1.1	.0	.2	.0	.0	.0	.0	.0
CLUSTERS	25.								0.	
MEAN	.130	.000	.4	.0	.1	.0	.0	.0	.0	.0
S.E.	.007	.000	.2	.0	.0	.0	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 4 TRAIL

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	BAD	OLD	NUMBER ROWS	LENGTH
226	.092	.000	.0	.0	.0	.0	.0	.0	.0	.0
229	.143	.000	.0	.0	.0	.0	.0	.0	.0	.0
232	.165	.000	2.3	.0	.2	.0	.0	.0	.0	.0
235	.122	.000	1.2	.0	.2	.0	.0	.0	.0	.0
238	.141	.000	.0	.0	.0	.0	.0	.0	.0	.0
241	.134	.000	.0	.0	.0	.0	.0	.0	.0	.0
244	.114	.000	.0	.0	.0	.0	.0	.0	.0	.0
247	.085	.000	.0	.0	.0	.0	.0	.0	.0	.0
250	.097	.000	.0	.0	.0	.0	.0	.0	.0	.0
253	.171	.000	2.6	.0	.5	.0	.0	.2	.0	.0
256	.122	.000	.9	.0	.2	.0	.0	.0	.0	.0
259	.128	.000	1.5	.0	.2	.0	.0	.0	.0	.0
262	.130	.000	.0	.0	.0	.0	.0	.0	.0	.0
265	.134	.000	.9	.0	.2	.0	.0	.0	.0	.0
277	.139	.000	6.9	.0	1.0	.0	.0	.0	.0	.0
280	.155	.000	4.7	.0	.7	.0	.0	.0	.0	.0
283	.131	.000	.0	.0	.0	.0	.0	.0	.0	.0
286	.131	.000	.0	.0	.0	.0	.0	.0	.0	.0
289	.135	.000	.0	.0	.0	.0	.0	.0	.0	.0
292	.116	.000	.0	.0	.0	.0	.0	.0	.0	.0
295	.000	.000	.0	.0	.0	.0	.0	.0	.0	.0
298	.198	.000	4.6	.0	1.0	.0	.0	1.3	.0	.0
CLUSTERS	21.								0.	
MEAN	.135	.000	1.2	.0	.2	.0	.0	.1	.0	.0
S.E.	.006	.000	.4	.0	.1	.0	.0	.1	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 5 BLUE BIRD

CLUSTER	BRANCH AREA (L*W)/2	GRID	EGG MASS / M**2 (L*W)/2	GRID	NUMBER	EGG MASS PER BRANCH GOOD	BAD	OLD	NUMBER ROWS	LENGTH
301	.141	.000	1.6	.0	.2	.0	.0	.0	.0	.0
304	.106	.000	.0	.0	.0	.0	.0	.0	.0	.0
307	.139	.000	3.9	.0	.5	.0	.0	.0	.0	.0
310	.080	.000	.0	.0	.0	.0	.0	.0	.0	.0
313	.089	.000	.0	.0	.0	.0	.0	.0	.0	.0
316	.193	.000	.0	.0	.0	.0	.0	.2	.0	.0
319	.188	.000	.0	.0	.0	.0	.0	.0	.0	.0
322	.155	.000	.0	.0	.0	.0	.0	.0	.0	.0
325	.182	.000	.0	.0	.0	.0	.0	.2	.0	.0
328	.132	.000	1.2	.0	.2	.0	.0	.0	.0	.0
331	.120	.000	.0	.0	.0	.0	.0	.0	.0	.0
334	.115	.000	.0	.0	.0	.0	.0	.0	.0	.0
337	.198	.000	.7	.0	.2	.0	.0	.0	.0	.0
340	.105	.000	.0	.0	.0	.0	.0	.0	.0	.0
343	.184	.000	.0	.0	.0	.0	.0	.0	.0	.0
346	.192	.000	.0	.0	.0	.0	.0	.0	.0	.0
349	.106	.000	2.2	.0	.2	.0	.0	.0	.0	.0
352	.146	.000	.0	.0	.0	.0	.0	.0	.0	.0
355	.164	.000	2.5	.0	.3	.0	.0	.0	.0	.0
358	.178	.000	.0	.0	.0	.0	.0	.0	.0	.0
361	.138	.000	6.0	.0	.8	.0	.0	.5	.0	.0
364	.141	.000	.0	.0	.0	.0	.0	.0	.0	.0
367	.176	.000	.0	.0	.0	.0	.0	.0	.0	.0
370	.138	.000	.0	.0	.0	.0	.0	.0	.0	.0
373	.102	.000	1.7	.0	.2	.0	.0	.0	.0	.0
CLUSTERS	25.								0.	
MEAN	.144	.000	.8	.0	.1	.0	.0	.0	.0	.0
S.E.	.007	.000	.3	.0	.0	.0	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 6 RED TOP

	BRANCH AREA		EGG MASS / M**2		EGG MASS PER BRANCH				NUMBER	
CLUSTER	(L*W)/2	GRID	(L*W)/2	GRID	NUMBER	GOOD	BAD	OLD	ROWS	LENGTH
376	.194	.000	2.0	.0	.2	.0	.0	.0	.0	.0
382	.114	.000	.0	.0	.0	.0	.0	.0	.0	.0
385	.166	.000	1.0	.0	.2	.0	.0	.0	.0	.0
388	.131	.000	.0	.0	.0	.0	.0	.0	.0	.0
391	.082	.000	.0	.0	.0	.0	.0	.0	.0	.0
394	.128	.000	.0	.0	.0	.0	.0	.0	.0	.0
397	.120	.000	5.7	.0	.7	.0	.0	.0	.0	.0
400	.153	.000	.0	.0	.0	.0	.0	.0	.0	.0
403	.093	.000	.0	.0	.0	.0	.0	.0	.0	.0
406	.127	.000	1.3	.0	.2	.0	.0	.0	.0	.0
409	.169	.000	.8	.0	.2	.0	.0	.0	.0	.0
412	.149	.000	.0	.0	.0	.0	.0	.2	.0	.0
415	.177	.000	.0	.0	.0	.0	.0	.0	.0	.0
418	.160	.000	.0	.0	.0	.0	.0	.0	.0	.0
421	.173	.000	.0	.0	.0	.0	.0	.0	.0	.0
424	.111	.000	.0	.0	.0	.0	.0	.0	.0	.0
427	.160	.000	.0	.0	.0	.0	.0	.0	.0	.0
430	.101	.000	1.3	.0	.2	.0	.0	.0	.0	.0
433	.183	.000	1.9	.0	.3	.0	.0	.2	.0	.0
436	.080	.000	.0	.0	.0	.0	.0	.0	.0	.0
439	.129	.000	.0	.0	.0	.0	.0	.0	.0	.0
442	.096	.000	.0	.0	.0	.0	.0	.0	.0	.0
445	.132	.000	1.1	.0	.2	.0	.0	.0	.0	.0
448	.149	.000	.0	.0	.0	.0	.0	.0	.0	.0
CLUSTERS	24.								0.	
MEAN	.133	.000	.6	.0	.1	.0	.0	.0	.0	.0
S.E.	.006	.000	.3	.0	.0	.0	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 7 OJITOS

	BRANCH AREA		EGG MASS / M**2		EGG MASS PER BRANCH				NUMBER	
CLUSTER	(L*W)/2	GRID	(L*W)/2	GRID	NUMBER	GOOD	BAD	OLD	ROWS	LENGTH
451	.180	.359	.0	.0	.0	.0	.0	.0	.0	.0
454	.171	.000	.0	.0	.0	.0	.0	.0	.0	.0
457	.136	.000	8.6	.0	1.0	.0	.0	.0	.0	.0
460	.150	.000	12.3	.0	1.7	.0	.0	.3	.0	.0
463	.181	.000	1.7	.0	.3	.0	.0	.2	.0	.0
466	.155	.000	1.0	.0	.2	.0	.0	.5	.0	.0
469	.171	.342	3.5	1.8	.7	.0	.0	.0	.0	.0
472	.172	.000	2.0	.0	.3	.0	.0	.0	.0	.0
475	.151	.000	.0	.0	.0	.0	.0	.0	.0	.0
478	.149	.000	5.8	.0	.8	.0	.0	.0	.0	.0
481	.176	.000	2.0	.0	.3	.0	.0	.0	.0	.0
484	.135	.000	.0	.0	.0	.0	.0	.2	.0	.0
487	.192	.000	.0	.0	.0	.0	.0	.2	.0	.0
490	.177	.000	.0	.0	.0	.0	.0	.0	.0	.0
493	.162	.324	.0	.0	.0	.0	.0	.0	.0	.0
496	.169	.337	.0	.0	.0	.0	.0	.0	.0	.0
499	.161	.322	.0	.0	.0	.0	.0	.0	.0	.0
502	.190	.000	.7	.0	.2	.0	.0	.2	.0	.0
505	.166	.332	.0	.0	.0	.0	.0	.0	.0	.0
508	.184	.000	.0	.0	.0	.0	.0	.0	.0	.0
511	.162	.324	.0	.0	.0	.0	.0	.0	.0	.0
514	.208	.000	.0	.0	.0	.0	.0	.0	.0	.0
517	.194	.000	.0	.0	.0	.0	.0	.0	.0	.0
520	.151	.000	.0	.0	.0	.0	.0	.0	.0	.0
523	.143	.000	.0	.0	.0	.0	.0	.0	.0	.0
CLUSTERS	25.								0.	
MEAN	.167	.094	1.5	.1	.2	.0	.0	.1	.0	.0
S.E.	.004	.031	.6	.1	.1	.0	.0	.0	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 8 LAKE FORK

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	OLD	NUMBER ROWS	LENGTH
526	.207	.000	.9	.0	.2	.0	.0	.0	.0	.0
529	.179	.000	1.9	.0	.3	.0	.0	.0	.0	.0
532	.173	.000	3.8	.0	.7	.0	.0	.0	.0	.0
535	.187	.000	1.6	.0	.3	.0	.0	.0	.0	.0
538	.164	.000	.9	.0	.2	.0	.0	.0	.0	.0
541	.164	.000	.0	.0	.0	.0	.0	.0	.0	.0
544	.196	.392	17.0	8.5	4.0	.0	.0	.0	.0	.0
547	.121	.000	25.3	.0	3.2	.0	.0	.3	.0	.0
550	.114	.000	.0	.0	.0	.0	.0	.3	.0	.0
553	.183	.365	12.8	6.4	2.3	.0	.0	.2	.0	.0
556	.152	.000	12.1	.0	1.8	.0	.0	.0	.0	.0
559	.125	.000	31.5	.0	4.0	.0	.0	1.8	.0	.0
562	.148	.000	18.3	.0	2.7	.0	.0	.0	.0	.0
565	.156	.000	7.7	.0	1.3	.0	.0	.5	.0	.0
568	.168	.000	18.7	.0	2.0	.0	.0	.5	.0	.0
571	.136	.000	43.0	.0	5.8	.0	.0	.5	.0	.0
574	.148	.000	.0	.0	.0	.0	.0	.0	.0	.0
577	.181	.362	37.3	18.6	6.7	.0	.0	.3	.0	.0
580	.169	.337	38.4	19.2	6.3	.0	.0	.3	.0	.0
583	.134	.000	5.4	.0	.8	.0	.0	.2	.0	.0
586	.122	.000	5.3	.0	.7	.0	.0	.2	.0	.0
589	.135	.000	24.6	.0	3.8	.0	.0	.2	.0	.0
592	.134	.000	31.4	.0	4.5	.0	.0	.0	.0	.0
595	.117	.000	72.2	.0	8.5	.0	.0	.3	.0	.0
598	.111	.000	38.6	.0	4.3	.0	.0	1.2	.0	.0
CLUSTERS	25.								0.	
MEAN	.151	.058	17.9	2.1	2.6	.0	.0	.3	.0	.0
S.E.	.006	.027	3.7	1.1	.5	.0	.0	.1	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 9 COCHITI

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	OLD	NUMBER ROWS	LENGTH
601	.140	.000	5.8	.0	.7	.0	.0	.0	.0	.0
604	.145	.000	5.7	.0	.8	.0	.0	.5	.0	.0
607	.177	.000	42.9	.0	6.5	.0	.0	.5	.0	.0
610	.177	.000	6.5	.0	1.2	.0	.0	.3	.0	.0
613	.152	.000	5.7	.0	.7	.0	.0	.0	.0	.0
616	.149	.000	3.1	.0	.5	.0	.0	.2	.0	.0
625	.167	.000	26.7	.0	4.3	.0	.0	1.2	.0	.0
628	.201	.401	8.4	4.2	1.7	.0	.0	.8	.0	.0
631	.135	.000	38.4	.0	5.2	.0	.0	1.5	.0	.0
634	.199	.000	18.6	.0	3.5	.0	.0	.0	.0	.0
637	.185	.000	15.4	.0	2.8	.0	.0	.2	.0	.0
640	.155	.000	25.5	.0	4.5	.0	.0	.2	.0	.0
643	.139	.000	6.3	.0	1.0	.0	.0	.3	.0	.0
646	.133	.000	13.2	.0	1.5	.0	.0	.0	.0	.0
649	.150	.000	9.3	.0	1.5	.0	.0	2.0	.0	.0
652	.135	.000	20.9	.0	3.2	.0	.0	1.5	.0	.0
655	.113	.000	16.2	.0	1.8	.0	.0	.0	.0	.0
658	.146	.000	106.7	.0	15.0	.0	.0	.0	.0	.0
661	.178	.000	9.2	.0	1.7	.0	.0	3.5	.0	.0
664	.182	.000	52.4	.0	8.8	.0	.0	1.7	.0	.0
670	.119	.000	4.0	.0	.5	.0	.0	.5	.0	.0
CLUSTERS	21.								0.	
MEAN	.156	.019	21.0	.2	3.2	.0	.0	.7	.0	.0
S.E.	.005	.019	5.2	.2	.8	.0	.0	.2	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 10 CAPULIN

CLUSTER	BRANCH AREA (L*W)/2	BRANCH AREA GRID	EGG MASS / M**2 (L*W)/2	EGG MASS / M**2 GRID	NUMBER	EGG MASS PER BRANCH GOOD	EGG MASS PER BRANCH BAD	OLD	NUMBER ROWS	LENGTH
673	.176	.000	7.5	.0	1.3	.0	.0	.2	.0	.0
679	.141	.000	5.2	.0	.7	.0	.0	.8	.0	.0
682	.122	.000	27.8	.0	3.7	.0	.0	1.8	.0	.0
694	.144	.000	5.2	.0	.8	.0	.0	1.2	.0	.0
697	.127	.000	14.8	.0	2.0	.0	.0	.2	.0	.0
700	.150	.000	15.5	.0	2.3	.0	.0	.7	.0	.0
703	.156	.000	24.6	.0	4.0	.0	.0	.2	.0	.0
706	.136	.000	36.0	.0	4.7	.0	.0	.2	.0	.0
709	.146	.000	18.5	.0	2.7	.0	.0	.3	.0	.0
712	.155	.000	3.9	.0	.7	.0	.0	.2	.0	.0
715	.136	.000	17.6	.0	2.5	.0	.0	1.8	.0	.0
718	.164	.000	51.6	.0	8.0	.0	.0	.5	.0	.0
721	.170	.000	22.2	.0	3.8	.0	.0	1.2	.0	.0
724	.143	.000	43.3	.0	6.0	.0	.0	1.8	.0	.0
727	.128	.000	39.6	.0	5.0	.0	.0	.8	.0	.0
730	.153	.000	35.8	.0	5.3	.0	.0	1.5	.0	.0
733	.195	.000	2.6	.0	.5	.0	.0	.0	.0	.0
736	.145	.000	2.2	.0	.3	.0	.0	.3	.0	.0
739	.169	.000	1.1	.0	.2	.0	.0	.0	.0	.0
742	.161	.000	3.3	.0	.5	.0	.0	.0	.0	.0
745	.188	.000	9.5	.0	1.8	.0	.0	.3	.0	.0
748	.163	.000	34.6	.0	5.7	.0	.0	.3	.0	.0
CLUSTERS	22.								0.	
MEAN	.153	.000	19.2	.0	2.8	.0	.0	.7	.0	.0
S.E.	.004	.000	3.3	.0	.5	.0	.0	.1	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1979 REGION 3 HOST 1 FOREST 10 UNIT 11 AMERICAN SPRINGS

	BRANCH AREA		EGG MASS / M**2			EGG MASS PER BRANCH			NUMBER	
CLUSTER	(L*W)/2	GRID	(L*W)/2	GRID	NUMBER	GOOD	BAD	OLD	ROWS	LENGTH
751	.120	.000	28.4	.0	3.8	.0	.0	.0	.0	.0
754	.112	.000	55.1	.0	6.2	.0	.0	1.8	.0	.0
757	.146	.000	4.8	.0	.7	.0	.0	1.2	.0	.0
760	.090	.000	17.3	.0	1.5	.0	.0	.0	.0	.0
763	.111	.000	41.8	.0	4.5	.0	.0	1.0	.0	.0
766	.157	.000	12.1	.0	1.8	.0	.0	.0	.0	.0
769	.129	.000	11.6	.0	1.3	.0	.0	.5	.0	.0
772	.108	.000	16.3	.0	1.7	.0	.0	.8	.0	.0
775	.159	.000	2.1	.0	.3	.0	.0	.3	.0	.0
778	.185	.000	2.7	.0	.5	.0	.0	.0	.0	.0
781	.153	.000	.0	.0	.0	.0	.0	.0	.0	.0
784	.131	.000	.0	.0	.0	.0	.0	.0	.0	.0
787	.122	.000	35.0	.0	4.2	.0	.0	.3	.0	.0
790	.118	.000	9.4	.0	1.2	.0	.0	1.2	.0	.0
793	.133	.000	4.5	.0	.5	.0	.0	1.2	.0	.0
796	.157	.000	1.3	.0	.2	.0	.0	.0	.0	.0
799	.194	.000	5.4	.0	1.0	.0	.0	.2	.0	.0
802	.197	.000	7.4	.0	1.3	.0	.0	.0	.0	.0
805	.135	.269	13.5	6.8	1.8	.0	.0	.0	.0	.0
808	.176	.000	28.9	.0	5.0	.0	.0	.5	.0	.0
811	.114	.000	16.0	.0	2.0	.0	.0	1.0	.0	.0
814	.138	.000	24.7	.0	3.7	.0	.0	.8	.0	.0
817	.159	.000	6.5	.0	1.3	.0	.0	.7	.0	.0
820	.160	.320	18.6	9.3	3.0	.0	.0	.2	.0	.0
823	.121	.005	12.6	66.7	1.3	.0	.0	.0	.0	.0
CLUSTERS	25.								0.	
MEAN	.142	.024	15.0	3.5	2.0	.0	.0	.5	.0	.0
S.E.	.006	.016	2.8	2.7	.3	.0	.0	.1	.0	.0

WESTERN SPRUCE BUDWORM EGG MASS - DEFOLIATION
SURVEY SYSTEM

TABLE 1: EGG MASS ESTIMATES - CLUSTER LEVEL MEANS

YEAR 1972 REGION 3 HOST 1 FOREST 10 UNIT 12 LOS ALAMOS

	BRANCH AREA		EGG MASS / M**2			EGG MASS PER BRANCH			NUMBER	
CLUSTER	(L*W)/2	GRID	(L*W)/2	GRID	NUMBER	GOOD	BAD	OLD	ROWS	LENGTH
826	.175	.000	17.8	.0	3.2	.0	.0	.0	.0	.0
829	.176	.352	.0	.0	.0	.0	.0	.0	.0	.0
832	.132	.000	2.3	.0	.3	.0	.0	.0	.0	.0
835	.164	.000	3.3	.0	.5	.0	.0	.0	.0	.0
838	.151	.000	12.8	.0	2.0	.0	.0	.0	.0	.0
841	.124	.000	40.4	.0	4.5	.0	.0	1.2	.0	.0
844	.184	.392	15.5	7.2	2.5	.0	.0	.2	.0	.0
847	.201	.000	36.9	.0	8.0	.0	.0	.0	.0	.0
850	.177	.000	39.2	.0	7.7	.0	.0	.0	.0	.0
853	.190	.000	27.2	.0	5.2	.0	.0	.3	.0	.0
856	.197	.000	24.7	.0	4.3	.0	.0	.5	.0	.0
859	.160	.000	25.0	.0	4.0	.0	.0	.8	.0	.0
862	.195	.000	13.7	.0	2.5	.0	.0	.7	.0	.0
865	.192	.000	15.4	.0	3.0	.0	.0	1.2	.0	.0
868	.129	.000	18.0	.0	2.5	.0	.0	.0	.0	.0
871	.181	.000	40.1	.0	7.3	.0	.0	.7	.0	.0
874	.165	.330	26.9	13.4	3.8	.0	.0	.0	.0	.0
877	.162	.000	22.4	.0	3.5	.0	.0	.7	.0	.0
880	.210	.420	.0	.0	.0	.0	.0	.0	.0	.0
883	.131	.000	3.6	.0	.5	.0	.0	.0	.0	.0
886	.152	.000	4.9	.0	.7	.0	.0	.0	.0	.0
889	.148	.000	1.5	.0	.2	.0	.0	.0	.0	.0
892	.146	.000	43.8	.0	5.5	.0	.0	.8	.0	.0
895	.143	.000	58.4	.0	7.0	.0	.0	.0	.0	.0
898	.146	.000	20.5	.0	2.5	.0	.0	3.0	.0	.0
CLUSTERS	25.								0.	
MEAN	.166	.060	20.6	.8	3.2	.0	.0	.4	.0	.0
S.E.	.005	.028	3.2	.6	.5	.0	.0	.1	.0	.0

NORMAL END OF JOB

@BRKPT PRINT$

C. Defoliation Data - 1979

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME SAN MIGUEL HOST DOUGLAS FIR YEAR 1979

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
1	1	25.3	12.8	.7
1	4	43.6	31.1	26.1
1	7	43.6	31.1	25.0
1	10	25.7	13.2	1.1
1	13	25.0	12.5	.5
1	16	25.1	12.6	.3
1	19	25.7	13.2	1.5
1	25	25.1	12.6	.4
1	28	25.0	12.5	.1
1	31	25.3	12.8	.5
1	34	26.0	13.5	2.4
1	37	25.4	12.9	.8
1	40	29.8	17.3	8.3
1	43	25.5	13.0	1.0
1	46	25.3	12.8	.6
1	49	25.2	12.7	.5
1	52	25.1	12.6	.5
1	55	27.3	14.8	3.8
1	58	29.0	16.5	7.7
1	61	25.1	12.6	1.0
1	64	25.0	12.5	.7
1	67	26.1	13.6	2.0
1	70	25.1	12.6	1.7
1	73	25.8	13.3	1.6

NUMBER OF CLUSTERS 24.			
MEAN	27.3	14.8	3.7
STANDARD ERROR	1.1	1.1	1.4
VARIANCE	26.7	26.7	49.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME JOAQUIN HOST DOUGLAS FIR YEAR 1979

		DEFOLIATION ESTIMATES		
UNIT	CLUSTER	4-CLASS	4-CLASS ADJ	6-CLASS
2	76	25.7	13.2	1.3
2	79	26.2	13.7	2.2
2	82	25.7	13.2	1.4
2	85	26.7	14.2	3.5
2	88	26.3	13.8	1.9
2	91	26.5	14.0	2.3
2	94	25.2	12.7	.3
2	97	25.7	13.2	1.2
2	106	25.7	13.2	1.3
2	109	30.0	17.5	9.6
2	112	25.8	13.3	2.4
2	115	25.2	12.7	1.4
2	118	25.0	12.5	.8
2	121	26.2	13.7	1.9
2	124	25.2	12.7	.5
2	127	25.0	12.5	.1
2	133	25.6	13.1	1.4
2	136	25.2	12.7	.8
2	13	25.2	12.7	.4
2	142	27.5	15.0	3.3
2	145	26.8	14.3	3.0
2	148	26.2	13.7	2.2

NUMBER OF CLUSTERS	22.			
MEAN		26.0	13.5	2.0
STANDARD ERROR		.2	.2	.4
VARIANCE		1.2	1.2	3.8

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME SMOKEY BEAR HOST DOUGLAS FIR YEAR 1979

		DEFOLIATION ESTIMATES		
UNIT	CLUSTER	4-CLASS	4-CLASS ADJ	6-CLASS
3	151	25.4	12.9	.9
3	154	25.2	12.7	.8
3	157	25.2	12.7	.8
3	160	26.3	13.8	2.4
3	163	25.0	12.5	.2
3	166	25.3	12.8	.6
3	169	25.7	13.2	1.1
3	172	25.0	12.5	.2
3	175	25.0	12.5	.0
3	178	25.0	12.5	.1
3	181	25.0	12.5	.3
3	184	27.5	15.0	1.6
3	187	25.2	12.7	.7
3	190	25.2	12.7	.4
3	193	26.7	14.2	2.7
3	196	26.6	14.1	2.9
3	199	26.2	13.7	2.0
3	202	25.1	12.6	.4
3	205	25.9	13.4	1.6
3	208	25.9	13.4	1.5
3	211	25.0	12.5	.2
3	214	26.0	13.5	1.7
3	217	25.1	12.6	.5
3	220	25.9	13.4	1.3
3	223	25.1	12.6	.7

NUMBER OF CLUSTERS	25.			
MEAN		25.6	13.1	1.0
STANDARD ERROR		.1	.1	.2
VARIANCE		.4	.4	.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME TRAIL HOST DOUGLAS FIR YEAR 1979

		DEFOLIATION ESTIMATES		
UNIT	CLUSTER	4-CLASS	4-CLASS ADJ	6-CLASS
4	226	25.0	12.5	.0
4	229	25.0	12.5	.0
4	232	25.0	12.5	.0
4	235	25.1	12.6	.9
4	238	28.6	16.1	5.6
4	241	25.3	12.8	.6
4	244	25.8	13.3	2.0
4	247	25.2	12.7	2.4
4	250	25.0	12.5	.0
4	253	25.0	12.5	.0
4	256	25.0	12.5	.0
4	259	25.0	12.5	.0
4	262	25.2	12.7	.6
4	265	25.4	12.9	.7
4	277	31.4	18.9	8.8
4	280	26.8	14.3	3.0
4	283	25.0	12.5	.0
4	286	25.2	12.7	.5
4	289	25.1	12.6	.2
4	292	26.9	14.4	2.3
4	295	31.7	19.2	10.0
4	298	33.2	20.7	11.5

NUMBER OF CLUSTERS 22.

	4-CLASS	4-CLASS ADJ	6-CLASS
MEAN	26.4	13.9	2.2
STANDARD ERROR	.5	.5	.7
VARIANCE	6.3	6.3	12.2

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME BLUE BIRD HOST DOUGLAS FIR YEAR 1979

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
5	301	25.0	12.5	.0
5	304	25.0	12.5	.6
5	307	25.2	12.7	1.0
5	310	25.0	12.5	.0
5	313	25.0	12.5	.1
5	316	25.4	12.9	.9
5	319	25.1	12.6	.3
5	322	25.2	12.7	1.8
5	325	27.7	15.2	7.2
5	328	25.0	12.5	.1
5	331	25.5	13.0	.7
5	334	25.9	13.4	1.5
5	337	27.0	14.5	2.7
5	340	25.4	12.9	.8
5	343	29.5	17.0	2.7
5	346	27.0	14.5	3.1
5	349	25.4	12.9	.5
5	352	25.0	12.5	.1
5	355	25.7	13.2	1.0
5	358	26.7	14.2	2.4
5	361	62.1	49.6	47.1
5	364	25.2	12.7	.4
5	367	25.1	12.6	.4
5	370	25.0	12.5	.0
5	373	25.0	12.5	.1

NUMBER OF CLUSTERS 25.			
MEAN	27.2	14.7	3.0
STANDARD ERROR	1.5	1.5	1.9
VARIANCE	54.1	54.1	86.7

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME RED TOP HOST DOUGLAS FIR YEAR 1979

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
6	376	28.0	15.5	4.4
6	382	26.4	13.9	2.1
6	385	28.1	15.6	4.2
6	388	30.5	18.0	7.4
6	391	27.0	14.5	2.7
6	394	25.9	13.4	1.3
6	397	27.7	15.2	4.0
6	400	26.4	13.9	2.0
6	403	25.6	13.1	.8
6	406	28.1	15.6	4.2
6	409	25.7	13.2	1.0
6	412	28.0	15.5	4.0
6	415	27.1	14.6	3.2
6	418	28.7	16.2	5.2
6	421	26.2	13.7	1.9
6	424	26.5	14.0	2.0
6	427	26.9	14.4	2.7
6	430	29.9	17.4	6.7
6	433	28.3	15.8	4.5
6	436	28.0	15.5	4.0
6	439	25.9	13.4	1.3
6	442	26.2	13.7	1.9
6	445	27.4	14.9	3.5
6	448	25.7	13.2	1.1
NUMBER OF CLUSTERS	24.			
MEAN		27.3	14.8	3.2
STANDARD ERROR		.3	.3	.4
VARIANCE		1.7	1.7	3.1

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME OJITOS HOST DOUGLAS FIR YEAR 1979

		DEFOLIATION ESTIMATES		
UNIT	CLUSTER	4-CLASS	4-CLASS ADJ	6-CLASS
7	451	27.2	14.7	6.9
7	454	36.4	23.9	15.2
7	457	37.7	25.2	18.3
7	460	38.2	25.7	17.7
7	463	30.4	17.9	8.7
7	466	30.4	17.9	7.6
7	469	37.9	25.4	17.9
7	472	32.5	20.0	10.7
7	475	30.7	18.2	7.8
7	478	27.4	14.9	4.1
7	481	25.0	12.5	.1
7	484	25.0	12.5	.1
7	487	29.3	16.8	7.7
7	490	25.1	12.6	.8
7	493	25.0	12.5	.8
7	496	31.7	19.2	13.2
7	499	32.8	20.3	13.8
7	502	25.4	12.9	1.1
7	505	27.7	15.2	8.5
7	508	25.7	13.2	3.1
7	511	25.1	12.6	.3
7	514	25.0	12.5	.3
7	517	25.0	12.5	.1
7	520	25.2	12.7	.4
7	523	28.1	15.6	5.5
NUMBER OF CLUSTERS	25.			
MEAN		29.2	16.7	6.8
STANDARD ERROR		.9	.9	1.3
VARIANCE		20.5	20.5	39.5

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME LAKE FORK HOST DOUGLAS FIR YEAR 1979

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
8	526	28.4	15.9	6.9
8	529	27.7	15.2	4.2
8	532	25.7	13.2	1.8
8	535	29.7	17.2	8.8
8	538	26.1	13.6	2.0
8	541	25.4	12.9	2.1
8	544	48.6	36.1	32.5
8	547	48.7	36.2	31.0
8	550	34.3	21.8	15.7
8	553	50.8	38.3	33.7
8	556	78.9	66.4	68.9
8	559	69.7	57.2	58.0
8	562	70.1	57.6	57.9
8	565	82.2	69.7	72.2
8	568	77.7	65.2	66.9
8	571	64.7	52.2	52.0
8	574	25.8	13.3	6.2
8	577	76.7	64.2	64.4
8	580	60.6	48.1	44.9
8	583	37.9	25.4	18.2
8	586	28.3	15.8	7.0
8	589	41.7	29.2	22.5
8	592	59.3	46.8	43.9
8	595	81.3	68.8	70.5
8	598	72.6	60.1	60.3

NUMBER OF CLUSTERS 25.			
MEAN	50.9	38.4	34.1
STANDARD ERROR	4.2	4.2	5.2
VARIANCE	445.4	445.4	664.4

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME COCHITI HOST DOUGLAS FIR YEAR 1979

		DEFOLIATION ESTIMATES		
UNIT	CLUSTER	4-CLASS	4-CLASS ADJ	6-CLASS
9	601	28.7	16.2	5.5
9	604	32.1	19.6	10.1
9	607	62.9	50.4	48.2
9	610	55.3	42.8	38.2
9	613	27.1	14.6	3.7
9	616	25.8	13.3	2.2
9	625	52.7	40.2	36.5
9	628	50.5	38.0	35.7
9	631	54.6	42.1	39.8
9	634	31.0	18.5	8.8
9	637	55.9	43.4	40.4
9	640	76.9	64.4	65.4
9	643	47.9	35.4	30.1
9	646	43.0	30.5	25.1
9	649	37.7	25.2	18.6
9	652	61.4	48.9	46.9
9	655	52.5	40.0	35.5
9	658	45.9	33.4	28.6
9	661	63.8	51.3	50.0
9	664	52.8	40.3	36.6
9	670	32.5	20.0	12.1
NUMBER OF CLUSTERS	21.			
MEAN		47.2	34.7	29.4
STANDARD ERROR		3.1	3.1	3.8
VARIANCE		196.3	196.3	303.6

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME CAPULIN HOST DOUGLAS FIR YEAR 1979

UNIT	CLUSTER	DEFOLIATION ESTIMATES 4-CLASS	4-CLASS ADJ	6-CLASS
10	676	54.9	42.4	38.3
10	679	38.7	26.2	18.7
10	682	34.2	21.7	12.5
10	694	40.4	27.9	20.8
10	697	50.5	38.0	33.2
10	700	47.2	34.7	29.7
10	703	48.6	36.1	30.3
10	706	58.9	46.4	43.2
10	709	44.3	31.8	26.9
10	712	82.2	69.7	73.1
10	715	50.7	38.2	32.2
10	718	49.2	36.7	31.9
10	721	57.7	45.2	41.5
10	724	53.7	41.2	36.9
10	727	42.3	29.8	22.9
10	730	60.1	47.6	43.9
10	733	28.1	15.6	6.4
10	736	30.4	17.9	8.4
10	739	28.2	15.7	5.0
10	742	31.7	19.2	10.0
10	745	43.5	31.0	27.8
10	748	46.6	34.1	29.4

NUMBER OF CLUSTERS 22.			
MEAN	46.5	34.0	28.3
STANDARD ERROR	2.7	2.7	3.3
VARIANCE	159.0	159.0	241.3

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME AMERICAN SPRINGS HOST DOUGLAS FIR YEAR 1979

		DEFOLIATION ESTIMATES		
UNIT	CLUSTER	4-CLASS	4-CLASS ADJ	6-CLASS
11	751	48.1	35.6	31.5
11	754	54.3	41.8	39.8
11	757	67.6	55.1	54.1
11	760	53.7	41.2	39.1
11	763	59.2	46.7	43.7
11	766	53.3	40.8	35.9
11	769	53.7	41.2	38.0
11	772	38.9	26.4	19.2
11	775	53.4	40.9	35.9
11	778	29.7	17.2	6.5
11	781	28.4	15.9	6.0
11	784	35.0	22.5	12.8
11	787	51.6	39.1	35.8
11	790	45.5	33.0	26.6
11	793	54.2	41.7	38.8
11	796	47.2	34.7	32.1
11	799	55.1	42.6	41.0
11	802	44.1	31.6	28.0
11	805	46.2	33.7	30.8
11	808	59.2	46.7	44.8
11	811	46.7	34.2	29.0
11	814	50.5	38.0	33.7
11	817	55.7	43.2	40.9
11	820	45.2	32.7	29.3
11	823	36.9	24.4	16.9

NUMBER OF CLUSTERS	25.			
MEAN		48.5	36.0	31.6
STANDARD ERROR		1.9	1.9	2.4
VARIANCE		86.8	86.8	139.0

WESTERN SPRUCE BUDWORM EVALUATION PROJECT

CLUSTER LEVEL MEANS - DEFOLIATION ESTIMATES

UNIT NAME LOS ALAMOS HOST DOUGLAS FIR YEAR 1979

		DEFOLIATION ESTIMATES		
UNIT	CLUSTER	4-CLASS	4-CLASS ADJ	6-CLASS
12	826	49.5	37.0	32.9
12	829	28.0	15.5	4.5
12	832	28.4	15.9	4.9
12	835	27.2	14.7	4.1
12	838	46.2	33.7	28.3
12	841	54.2	41.7	37.4
12	844	80.6	68.1	69.8
12	847	52.3	39.8	36.5
12	850	49.5	37.0	31.6
12	853	52.2	39.7	36.1
12	856	61.3	48.8	46.1
12	859	46.5	34.0	31.1
12	862	52.6	40.1	36.5
12	865	64.2	51.7	50.2
12	868	59.7	47.2	44.8
12	871	81.1	68.6	70.2
12	874	44.4	31.9	26.5
12	877	50.6	38.1	33.9
12	880	31.7	19.2	9.5
12	883	30.7	18.2	8.9
12	886	32.8	20.3	11.2
12	889	27.0	14.5	4.0
12	892	39.2	26.7	20.1
12	895	58.8	46.3	45.2
12	898	39.1	26.6	23.0
NUMBER OF CLUSTERS	25.			
MEAN		47.5	35.0	29.9
STANDARD ERROR		3.1	3.1	3.8
VARIANCE		232.6	232.6	355.2

NORMAL END OF JOB

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